May 1990 Vol. 3 Nº 8 Price £2.00

Archive

The Subscription Magazine for Archimedes Users

Soundtracker on the Archimedes

RISC-OS for Beginners – 1

DTP with Pipedream

Fonts on the Archimedes / Thoughts on Unix

Archimedes in Education / Intro to C – Part 7

Reviews: Caverns, Guild of Thieves, The Pawn, Studio 24 Plus, E-Type Designer, Hyperbook, 2 technical books, Family Favourites.

What price Acorn's new ARM3 machine?

Information about Acorn's new ARM3 based computer system is beginning to trickle out from behind the locked doors of Fulbourn Road. Basically, it looks like... very big, very powerful, not very soon and very expensive – too expensive, I suspect, for most of us. (More on page 13.)

I find the news a little disappointing in one sense. What I enjoy about running Archive is that it is all about *enthusiasts*. OK, as the software base increases, there are more and more non-technical people owning Archimedes computers, which is great, but Archive itself exists because of the enthusiasm of its reader/contributors. The likely high price of the new machine means that it will be out of the reach of most of the existing Archimedes enthusiasts.

This news changes things for people who are hovering – "Should we buy a A410 now and upgrade it? Or should we wait?" There are other factors, too – the £120 price drop in the price of the A410 (see page 2), the continuing slide in the price of ram (page 2 again), the Video Enhancer giving even higher resolution colour graphics for only £35 (page 4), the 8M + ARM3 upgrades coming from Watford (page 6) and Atomwide and the general drop in the price of hard drives, both ST506 and SCSI. All together this means that you can have a very powerful and upgradable computer **now** instead of waiting until the end of 1990.

Add to this the fact that the software houses are realising that the Archimedes (with the A3000) is beginning to represent a reasonable sized market which makes it worth while investing time and money in development work, and you have a very encouraging picture for the Archimedes.

The A3000, too, is likely to do well this year in the form of *'The Learning Curve'* where it is bundled very attractively, price-wise, with Genesis, First Word Plus, PC Emulator, a book and an instructional video. (£699 + VAT without a monitor.)

I'm excited about the future of the Archimedes and I look forward to being of service to you in your use of this impressive computer system.

Yours as ever,

Paul B.

Government Health Warning – Reading this may seriously affect your spiritual health.

"On the third day, Jesus rose from the dead..." What?!?! Well, that's what most Christians say each Sunday. Do they really believe that? Surely they know that dead men don't come back to life except in horror films!

I think that if you come to the bible as an outsider and read the bald statements that the early disciples made about Jesus having risen from the dead, you will be shocked by the directness of their claims. It makes uncomfortable reading – unless, of course, you dismiss the whole lot as unreliable – but that is an irrational response because the bible is so well supported as a historical document with many very early manuscripts and non-Christian contemporary literature and archaeological findings which all support the accounts.

There are people, like the Bishop of Durham, who try to make Christianity easier to believe, by sanitising the accounts of the resurrection and saying that Jesus was not **physically** raised from death – it was a "spiritual" event, whatever that means. Sorry, but to a simple-minded soul like me, when the writers of the New Testament were prepared to stake their lives (literally) on the fact that, "he was buried... he was raised... he appeared to his disciples..." then either they are lying or it is true – Christ did rise from the dead so we really ought to listen to the claims he made.

If you want to check this out, try reading 1 Corinthians chapter 15 as a starter, then read, say, Luke's gospel account of the events surrounding Jesus' death and resurrection (Luke chapters 22 – 24).

Archive

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Archive magazine is edited by Paul Beverley and published by Norwich Computer Services.

Products Available

• **A3000 Technical Manual** – Acorn have produced a manual for the A3000 which includes full circuit diagrams including the User port/Midi I/O podule and various other bits of hardware and interfacing information (£29.95 from Acorn or £28 through Archive). It consists of an A4 ring binder with 32 pages of text plus all the various physical and circuit diagrams, some of which are in separate plastic folders.

• **A400 series prices reduced** – Acorn have reduced the prices of the A410, A420 and A440/1 as well as the A3000. Also, if you are thinking of an upgraded 410, note that we now sell Oak Computers' ST506 drives which are cheaper than the Computerware equivalents. Acorn's new prices and the upgraded 410 equivalents (all including VAT) are as follows:

	Acorn		Our	Acorn	Our
	Old	New	equiv.	Educ.	equiv.
A3000	746	689	–	574	–
A410/1	1379	1264	–	1034	–
A420/1	1954	1724	1530	1466	1304
A440/1	2874	2414	1860	2053	1634

The Archive prices include £50 worth of free software of your choice with an A3000 and £100 worth of free software with a 410.

(If you want an Acorn monitor at the same time, add £230 and if you want an Eizo 9060SZ low-radiation, multi-sync monitor at the same time, add £510.)

• **A410 ram upgrades** – The threatened price rise has not come – 410 ram is still only £80/Mbyte and if you buy it fitted into an A410, it is only £70/Mbyte as reflected in the Archive prices for upgraded 410's quoted above.

(Note that an Archimedes can only have 1, 2 or 4 M of ram, not 3. So, if you order "2M of ram for a 410", we will presume you mean that want a further 2M to add to your already upgraded 2M computer.)

• **Apocalypse** – 3D space shoot-em-up game from 4th Dimension which also requires some brain power – £29.95 (or £28 through Archive).

• **Archive Monthly Program Discs** – To reiterate for the benefit of new members of Archive, these are available at £3 each. There is one each month and, although there is no disc subscription as such, you can order them in advance. So you could send in, say, £18 and ask for the next six program discs starting from Volume 3, issue 8, or whatever. When we send out the last disc for which you have prepaid, we put in a note to that effect.

What is on the discs? Well, to be frank, the contents is very variable. If there are any listings in the magazine, whether in main articles or in Hints & Tips, they will be put on the disc. Then, if any of the contributors send in sample files, we include those. For example, Gerald Fitton has included a lot of examples that readers have sent in of applications of Pipedream. Then, if there are other public domain programs or demos we have lying around, we may stick a few of those on it. So, sometimes it represents exceptional value at £3 but at others less so. Unfortunately, we haven't really got the time to ensure that the standard is maintained at a constant level, so it's up to you to decide if it is worth paying £3 a month in advance or if it's better to wait and see what the magazine says is on the disc.

• **Brainsoft Multi-I/O podules** – Unfortunately there has been a problem with the supply of the Brainsoft I/O podules. Technomatic who are now, we understand, the sole agents for Brainsoft, do not seem able or prepared to give us any discount. We will therefore be unable to supply them.

• **Bug Hunter / Moon Dash** – Two in one games from Minerva. Bug Hunter is an animal going round various rooms trying to pick up objects and drop them on top of a variety of insects. Moon Dash is a variation on space invaders. £17.95 or £17 through Archive.

• **Careware №7** – contains all sorts of utilities such as Keith Sloan's new improved !PCDir 1.00, for transfering files between Archimedes and MS-DOS, !FontEd, !Chars, Sprite <–> GIF, Amiga/ST/MacPaint –> Sprite, Draw –> Meta-files, 12 BBC fonts, Batch file printer driver, Printer buffer, Z88 link, File utilities, Desktop BASIC module, Jot pad, Application examiner, Low-memory screen mode and various other bits and pieces.

• **ChangeFSI** – Acorn have changed the status of the graphics application, ChangeFSI. After releasing it into the public domain including putting it as a free download on SID, Acorn have now decided that it is no longer public domain! I'm not sure whether they expect the hundreds of people who already have the program to destroy their copy, but they say it is now no longer to be distributed on our Shareware discs. We have complied with their request and replaced it on Shareware 21 with !Translator written by John Kortink which is, so I am told, as good as ChangeFSI anyway. (John reckons it is better, but I suspect he may be biassed.)

• **Colour Video Digitiser** – MicroEye 1A is a new colour video digitiser with multi-tasking software from Digithurst, a large company who produce digitisers for a wide range of computers. There is a version for the A400/1 series at £400 + VAT and one for the A3000 series at £495 + VAT. Note though that the software requires 2M ram minimum, so it could not be used on an unexpanded A310. Also available is Picture Book (£99 +VAT) which is a database for pictures and text.

• **DIY hard discs for A410** – If you have an A410 and would like to put a hard disc in it, you should realise that you already have the hard disc controller hardware. Thus, all you need is a suitable ST506 hard drive, some metalwork, screws and a pair of cables. (The HFORM program is on the RISC-OS Support Disc.) Drives can often be bought, from various sources, more cheaply than through Archive, so if you want to go down that route, we can sell a hard disc mounting kit for £19 which consists the metalwork, screws and a pair of cables. You should note, of course, that doing it this way is a little risky in that it may be difficult to get support if it doesn't work properly when you have set it up.

• **Geoscan (version 3)** – A teaching aid for GCSE and A level. It consists of (1) a booklet of worksheets and ideas for more worksheets and (2) a wimp based database of 100 countries with 80 items of data on each. Information is presented in charts and diagrams and can be subjected to various statistical calculations. Geoscan is £45 from Passkey Marketing.

• **Integrex colour dump** – D.W.Brown has produced a colour dump for the Integrex colour printer which is claimed to have a better colour gradation than the one supplied with Pro-Artisan. He will supply this for £17 inc p&p. He also has an enhanced version which allows a colour to be picked off the screen and printed out with varying shades. The required shade can then be selected and your range of shades can be stored on disc for repeated use. Using this facility, you can "fine tune" your colour dump. This version is £25 inc p&p. (D.W.Brown, 2 Westend Villas, Westend Parade, Gloucester, GL1 2RY. 0452–417697.)

• **JOY-sticks!!!** – If you pass 18 Mile End Road and see a flag flying over the building it's because, after months of frustration, we now have joysticks in stock. We were getting a few joysticks at a time and maintaining a back order list of, at times, up to 50 customer's orders, but Voltmace have finally provided us with a reasonable volume of their Deltacat Mouse Eliminator joysticks.

According to my two games consultants, Tim and Jonathan Beverley, several games, most notably Interdictor and Rotor, are much easier to play when using a joystick. Voltmace joysticks are now available from stock at £28.

• **Maddingly Hall** – Adventure game from Minerva £14.95 (or £14 through Archive). "Murder, mystery and intrigue in this text and graphics adventure. Bertie Hall, a single young man with a reluctance to work, is running short of money. In an attempt to solve his problems, he arranges to visit rich Aunt Agatha... "

• **Maths Pack 1** – HS Software have produced Maths Pack 1, 'a totally new concept in educational software' for just £11.95. Designed for National curriculum key stage 1, age 5 – 7 years.

• **Pineapple Digitiser** now available for A3000. The popular Pineapple colour digitiser can now be operated on the A3000 by buying their convertor kit – basically a metal housing plus a 12V power supply – for £65 + VAT. (The software supplied with the digitiser has also been improved by adding powerful noise reduction and outline drawing facilities.)

• **Price cuts** – Various items on the Archive Price List have come down in price as a result of getting better bulk discounts on behalf of subscribers: Computerware's hard disc podules for A310 (including metalwork and cables) are now available

for £220. Panasonic printers: the 9-pin, KX-P1081's are now down to £175 and the 24-pin KX-P1124's are down to £275. Morley's A3000 memory boards are down in price – 1M is now £110 and 3M is £330. If you have a 1M Morley board and want to upgrade it to 3 M, just send it back to us with a cheque for £220. (Remember, all the Archive prices include VAT and UK carriage.)

• **RISC-OS upgrades** – If you are still using the Arthur operating system and want to upgrade to RISC-OS, we still have a number of upgrades available. The full price is £36 but to clear the stocks, we will sell them at half price (£18).

• **Serial Link to BBC** – Ivoryash Ltd have produced a true RISC-OS serial link to BBC Micro. It installs as a disc icon on the icon bar and thereafter is accessible as any other filer under RISC-OS. Good value at only £9 for the software on its own. If you buy it with a serial lead, it costs £20. (Both prices include VAT and p&p.)

• **Shareware 24** is now available. It contains two applications – bar chart generator and a simple database, two games – ballroom blitz and ladybird, some 16-bit soundtracker music, various utilities including desktop options for *Copy *Wipe and *Count, desktop options for Epson LX printer, a desktop printer text spooler and screen modes 20 and 21 for NEC 3D multisync monitor.

• **Shareware 25** is a Maths Disc compiled by our own Brian Cowan partly from his own work and partly from contributions from readers.

It contains various programs: Numerical integration, Simpson's rule, Solution of polynomial equations, Cubic splines and interpolation, Primes, Series, Puzzles, FFT: BASIC, FFT: Assembler, Function plotter, Extended precision calculator, Recurring decimals, Superfast 3-d surface plotter with movable views, Frequency and time response of linear circuits, Pole zero plots.

It also has a number of BASIC functions and procedures which you could include in your own programs: Beta function, Binomial coefficients, Elliptic integrals, Error function, Complementary error function, Factorial, Gamma function, Logarithmic gamma function, Polynomial interpolation, Simpson's rule integration, Trapezoidal integration, Write# in ASCII form, Hyperbolic functions and inverses, Complex arithmetic and functions, Polar to rectangular conversion and Matrix operations: transposition, identity matrix, determinant, solve linear equations, inverse matrix, decomposition, displaying arrays and complex matrix operations. For anyone needing mathematical applications, this is a very good £3 worth! Thanks to Brian and all the contributors.

• **Splice** – a film editor from Ace Computing (£30 or £25 through Archive) allows you to examine and edit a film, frame by frame. If used in conjunction with any art package, e.g. !Paint, it can allow you to make simple cartoons by drawing each frame.

• **Talisman** – A new game from Minerva. Looks like variations on a theme of Thundermonk. £14.95 or £14 through Archive.

• **The Olympics** – 4th Dimension's new Olympics program is available now at £19. It consists of two discs and includes Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault!

• **Tween** – from Ace Computing (£30 or £25 through Archive) produces films from Draw files. It uses techniques similar to Mogul and generates a film by calculating intermediate frames from a set of key positions.

• **Video Enhancer** from Atomwide (£35 through Archive) is a hardware add-on which increases the speed of the VIDC clock so that higher resolution modes can be displayed in colour. It can produce up to 1024 x 640 or 1280 x 480 in up to 16 colours. Since the sound is generated by the VIDC, one side effect is that when the enhancer is used, the pitch of all sound goes up a perfect fifth! This is no problem as you can switch the higher speed clock on and off by using a toggle switch. It can alternatively be software switchable but this involves removing the main p.c.b. and soldering it, so it should only be undertaken by an Acorn component level service centre. If you are prepared to have it hardware switched, you can fit the board yourself with a Philips screwdriver and a bit of common sense. The enhancer comes with a disc providing various new modes you can use though, of course, the enhanced displays can only be viewed on multi-sync monitors. (Atomwide tell us that these higher resolution modes do not show up very well on the Taxan 770, but are excellent on the Eizo 9060.) A

Forthcoming Products

• **Computerware's A310 memory upgrades** are almost ready. Having seen the prototype, I would say that they are better than currently available upgrades in various ways. Firstly, they are ARM3 compatible. Secondly, they are upgradable from 2M to 4M (though it is a dealer upgrade.) Thirdly, it will allow you to put in the larger RISC-OS chips when and if they become available.

The prices are similar to the Watford Electronics upgrades: the 2 M board is £375 and the 4M is £585. The units are self-fittable, with care, but prices include fitting by Computerware and collection from and return delivery to your home address. I don't know exactly when they will be available but it is likely to be within the next few weeks. Supply may be a little erratic at first, so if you want to order one, send a separate cheque which we can hold and not bank until we are able to supply.

• **The Watford 8 MB upgrades** for 440 series machines should be available 'soon'. They plug into the MEMC and CPU sockets only and so, unlike the Atomwide upgrade, do not use up any podule slots. As the board uses the CPU socket, the boards can also be made available as a combined 8 MB + ARM3 upgrade.

A mechanically similar combined 4 MB + ARM3 upgrade for 300 series machines will also be available 'soon'. A

Matters Arising

• **Archive BBS** – The new password for Archive BBS is "Olympics". The board is working reasonably well now though there is still something of a legacy from the damage done by the hacker when the board was still in London. You may also find that you have problems with line noise. The lines that we have at present (3 of them) on 0603–745932 are NOT digital lines even though we specifically asked that they should be so. Apparently there is a new digital exchange being installed but it will not be commissioned until July or August. In the meantime, I hope you will bear with us.

• **No SID EMail!** – The SID EMail service (Archive 3.7 p9) has now been closed due to 'costs involved in sending replies'. I used it via JANET – I don't know if it is still available via other EMail routes. Mike Harrison

• **Z88 program** – The all-in-one Z88 file transfer program referred to in David Holden's article last month (page 56) didn't make it onto the monthly program disc – sorry, but there wasn't room. It was put instead, on Careware Nº7. In case you don't want the other programs on that disc, we'll try to put it on this month's program disc. A

Contact Box

• **A.B.U.G.** is short for Acorn (Archimedes) and BBC user group, anyone who is interested in this club should contact Mick Cattell, 128 Greenhill Avenue, Sheffield, S8 7TF or telephone 0742–745209.

• **Dutch Bulletin boards** – There are five boards in Holland and they would welcome some English callers. They are: GNOME on 53763038, HUCO on 180430785, Acorn BBS on 206631849, La Luna on 250341891 and BBC BBS on 15623748. In each case you need to add the international code for Holland in front of the number, i.e. 010–31–etc.

• **Fareham & Porchester Computer Club** meets regularly at the Porchester Community Centre. Anyone who is interested should contact Mr P Gardner at 26 Weston Avenue, Milton, Portsmouth, PO4 8JH or telephone 0705–731652. A

Ace Computing

RISC OS Euclid is the best multi-tasking 3D graphics and animation system for the Archimedes. It works like a 3D version of Draw, and now forms the centrepiece for a number of related products allowing the creation of complex animation sequences with the minimum of effort.

Mogul makes full use of **Euclid**'s unique hierarchical data structure to generate films of 3D objects with articulated motion and simultaneous camera motion.

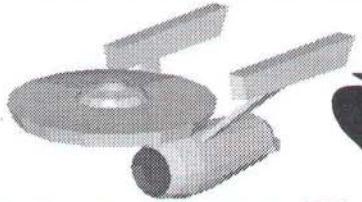
Tween produces films from Draw files. It uses techniques similar to **Mogul** and generates a film by calculating intermediate frames from a set of key positions.

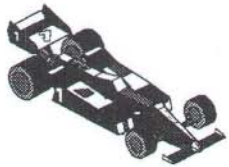
Splice allows you to edit films produced by **Mogul** or **Tween**. You can even produce hand-drawn cartoons by converting sprites from any source.

Support is provided for import and export of Sprites and Drawfiles. Films can be played by the **Projector** which comes free with **Euclid, Mogul, Splice and Tween**. Films and Euclid files can be used with Genesis.

Such is the enthusiasm for **Euclid** there is now a user group called **Elements** which provides a quarterly disk containing hints, tips, animations and user pictures like the ones in this advertisement.

Euclid £70 **Mogul** £20 **Splice** £30
Tween £30 **ArcLight** £50
Ace Computing, 27 Victoria Road,
Cambridge, CB4 3BW.
Tel: (0223) 322559
All prices include VAT and P&P.





Ace Computing

Hints & Tips

• **Auto-Booting on Startup** – The following tip is of particular use to users of hard disks.

With so many extensions to RISC-OS being available, most notably the Outline Font Manager, it can be inconvenient if your applications can't find them and even worse if the first !System directory that is seen is on a floppy.

The simplest solution to this is to put !Fonts and !System in the root directory of your hard disk and then open the root directory as your first action.

However, if the same action has to be performed repeatedly, then the computer must be able to do it for you and it can.

First you should create a command file called !Boot in Edit. This should contain something like:

```
adfs::4.$.!System
adfs::4.$.!Fonts
DESKTOP
```

This will then initialise the system and font paths before starting the desktop. To make it run on startup, you must configure the system to execute the !boot file, this is done from an operating system * prompt by:

```
*configure boot
*configure drive 4
*opt 4,3
```

The last option sets the current drive to execute the !boot file, rather than attempting to run it as a BASIC program.

This is not the end of the startup. When you invoke the desktop, it is possible have one or more applications run automatically. To run a single application, just append the application path on the end of the DESKTOP command, for example:

```
DESKTOP adfs::4.$.!Edit
```

This will startup the desktop with Edit on the menu bar. To initialise more than one application, you specify a text file which lists all the applications that you wish to start.

```
DESKTOP -File adfs::4.$.Startup
```

The file Startup might contain the following list of files:

```
adfs::4.$.!Draw
adfs::4.$.!Edit
adfs::4.$.!Paint
```

This will then enter the desktop and start Draw, Edit and Paint automatically. One word of warning, if you are limited to 1 Mb, be careful as it would be very easy to use up all the available memory.

Further customisation could be had by adding RMload commands to the !Run file of !System to automatically load modules (such as NewModes) and Filer_OpenDir pathname to the !Run files of applications in the startup file to automatically open directory viewers. Phil Kitching

• **BasicEdit** – For users of the Data Store !BasicEdit application: Because this application uses the DSUtil module to alter the operation of the mouse pointer it is not possible to run desktop programs successfully from Edit without returning to the desktop first. This, however, has the disadvantage that programs are more difficult to debug: when a program ends it returns to the desktop and all the variables are lost. A few simple changes to the !BasicEdit.!RunImage program, however, seem to provide a satisfactory remedy. Insert near the start of the program the following function key definitions:

```
*KEY 2 *BEUtilOff|M*BASIC|MOLD|M
                                RUN|M
*KEY 3 *BEUtilOn|MEDIT .|M
```

Then to run any program from the Edit screen simply press <f1> once and <f2> once. If the program uses the Wimp, the desktop will reappear as it was before you ran !BasicEdit with the new program running as well. After the program ends, a "command window" will appear where you can use LVAR or any other BASIC commands. To return to the Edit screen where you left it, simply press <f3>. Hugh Eagle

• **Battery changing** – You don't have to bother with adding capacitors etc as mentioned last month. All you need to do is leave the computer switched on while changing the batteries (but mind your fingers on the fan!). There is no danger involved, as the mains is totally enclosed, and it will not harm the machine. Mike Harrison.

• **C programming** – When writing desktop applications, put --DATE-- in the version string. So, if you forget to update the version number when modifying the source files, it doesn't really matter because when the info is given from the menu, you can then find out what date the file was compiled. R Bunnett.

• **Closing the Edit window** using <adjust> (instead of <select>) the source directory is opened after the window has been closed. Holding the <shift> key down simultaneously, will cause the directory viewer to be opened without closing the Edit window (this allows you to drag-save the file into the same directory, but with a different name). This is also true for Draw and Paint.

• **Double clicking problems** – Double clicking on an application installed on the icon bar by !TinyDirs can result in the application running twice. This can have the confusing result that when you quit the application a second copy of it immediately appears in its place.

I have found a somewhat cumbersome solution to this problem which is to include the following code in the WimpPoll loop:

```
WHEN 17 : IF block%!4<>TaskId%
    AND block%!16=&400C2 THEN
PROCInsertCR(block%+28)
dummy$=$(block%+28)
IF dummy$=TaskName$ THEN
quit%=TRUE
ENDIF
ENDIF
   .
   .
DEF PROCInsertCR(mem%)
LOCAL I%
I%=mem%
REPEAT
I%+=1
UNTIL ?I%=0
?I%=13
ENDPROC
```

When the first application receives the message that is broadcast when a new application starts (i.e. it receives reason code 17 with block%!16=&400C2) and it finds that the new task has the same name (TaskName$) as itself, it sets quit%=TRUE which makes the application quit at the end of the poll loop.

Note that when each application starts, it receives the message broadcast by itself, hence the comparison of block%!4 (which holds the handle of the sender of the message) with TaskId% to prevent the task from shutting itself down!

Note also that the little procedure PROCInsertCR seems to be necessary to convert the string at block%+28 from a zero terminated string to a normal &0D terminated one. (Can anyone explain please RISC-OS's infatuation with these wretched zero-terminated strings ... and to say that it's because C or Unix, or whatever, uses them is no answer!) Hugh Eagle

• **Filer_OpenDir** – The command 'Filer_Open Dir' may be used for any file path. This includes 'filing systems' created using a system variable (e.g. System$Path) may be referred to as the filing system 'system:'. Some 'filing systems' are one direction only (e.g. printer:). The command can also use SystemDevices' own 'filing systems':

kbd: / rawkd:	the keyboard
null:	the 'null device'
printer:	the printer
serial:	the serial port
vdu: / rawvdu:	the screen
netprint:	the network printer

Examples: dragging a file onto the view opened by:

`*Filer_OpenDir printer:` will spool it to the printer

`*Filer_OpenDir vdu:` will send it to the vdu driver (try it with a text file)

`*Filer_OpenDir null:` <shift> dragging will 'move' a file to null: i.e. delete it

• **FormEd Update** – Users who have downloaded the !FormEd template editor from Acorn's SID board (also available on shareware disc 20) might like to know how to put back the 'sprite routines'.

The version of !FormEd refered to has a !Help file stating a date of 16-May-89, and a ReadMe file stating version 1.00, but shows version 1.01 and date of 23-May-89 in its Info window. The ReadMe file shows that this is an unsupported Acorn application.

The !Help file states 'Some previous versions of FormEd used to provide facilities for editing sprites. These are now provided only in the !Paint application', also that when a sprite file is dragged onto the FormEd icon on the iconbar, a window will display the sprites. In the supplied state, no window is opened and you do not know what your sprite names are, or even if you have loaded the correct file, until you define an icon as a named sprite which you hope is in the file!

I was having problems with not enough memory on a 1Meg machine for !Paint, !FormEd, the sprite files and the templates being built. (It IS possible with very careful setting of the 'Free' and 'Next' bars in the Task Manager, but you can't have any printer drivers etc). An examination of the !FormEd revealed that by removing the REM statements from just 2 lines the sprite routines were again available.

Load the !RunImage for !FormEd and LIST lines 2270 and 3080. Edit those lines to remove the REM before PROCspriteinfo in each, so that the lines are as shown below:

```
2270 WHEN &FF9:PROCloadsprites (f$)
                        :PROCspriteinfo
3080  PROCloadsprites(FNstring0(q%
                    +44)):PROCspriteinfo
```

Save the file back to the disk. When a sprite file is dragged to the FormEd icon, a sprite window is shown and the sprite editing routines appear to work OK (although !Paint is more powerful). Douglas Potter

• **GraphBox** – Maybe this is an obvious point to some users but it took me a while to discover. Graphs imported into !Draw can be disassembled to a remarkable degree (using ungroup) right down to facets of individual 3D bars. This allows extensive re-orienting, re-colouring options which can avoid some of the problems with dark colours and overlaps when colour printing on a dot matrix printer. John Wann

• **Hardware developer's tool** – On the monthly program disk is a utility ('SVCBAS') which is very useful for hardware developers. It patches BASIC so that memory indirection operators (? and !) operate in supervisor mode. This allows quick 'tweaking' of hardware devices while testing. Documentation is minimal, since those who are likely to need it should not need any! Mike Harrison.

• **Maestro** – There are (I think!) several errors in the description of the !Maestro file format on pages 1809 to 1813 of the PRM:

a) in the 'Music data' the number of bytes of gate data is given, not the number of gates as the PRM says
b) the number of bytes of gate data is preceded by &40
c) each of the next eight words (which give the length in bytes of the queues of note/rest data for the eight channels) is also preceded by &40
d) in the 'Stave data', the number of music staves is reduced by 1 (i.e. if there are 4 music staves this is recorded as 3)
e) in the descriptions of the 'Gate Attributes', the binary representations of the bottom few bits of each byte are given with the least significant bit first. Thus where the 'Clef' description says "Bits 0 – 2 : 001 binary" it means that bits 0 and 1 are 0 and bit 2 is 1.
f) within the 'Clef' attribute data, the stave number (minus 1) is given in bits 6 and 7, not bits 5 and 6. Hugh Eagle

• **Problems with an Epson LQ1050?** When printing from Impression, !Draw, etc using the !PrinterDM application, the 360 x 360 dpi mode may cause spurious characters to be printed, which results in a poor quality printout. The reason for this is that the firmware in the Epson printer does not support the [Esc]+ control sequence which is necessary to set a line feed of 1/360th of an inch. In order to get this option working you will need a new version of the printer's ROM. This can be purchased from Applied Technology Ltd. David Crofts

• **Re-inking your ink-cartridge** – It is possible to re-ink an ink-cartridge for an HP-Deskjet Plus printer and probably other inkjet printers by buying one of the inks listed below and then using a syringe to insert the ink through a hole on the top of the cartridge. (a) Fountain pen ink (Pelikan), (b) Diadye ink (photo-shop), (c) Rotring air-brush ink. Tony Hopstaken

• **Rotor passwords** – Lee Thake has sent in the passwords for Rotor, but in case you would rather not know, here they are in very simple coded form

so that once you have the first password, you will be able to work out the others. QJU, HBH, MJQ, TMZ, NFX, BXF, UOU, FOE.

• **Sparkplug** – We have a lot of questions about how to decompress programs such as PCDir which appear on our program and Shareware discs. Let me try to explain in more detail.

The reason the programs are compacted is that there would not be enough room on the disc for the uncompacted version. Thus, if you are to uncompact them, you need to do so onto another (preferably blank) disc. If you have two drives or a hard disc on your computer, the job is easier then if you are trying to do it on a single drive, so I will do it the hard way first.

Insert a blank disc in the drive and open its filer window. Remove this disc and insert the Program Disc (or Shareware disc, or whatever) in the drive and open its filer window. If you have not already done so, install !sparkplug onto the icon bar by double-clicking on it. Drag the icon of the program to be decompacted onto the !sparkplug icon on the icon bar. A pseudo-filer window opens. Drag the icon or icons from there into the filer window of the blank disc. You will be prompted to insert that disc into the drive and will probably then have to keep swapping the discs over as prompted until all of the compacted files and folders have been uncompacted and copied across onto the other disc. This may actually require quite a number of repetitions, so it may be better to create as large a ram disc as possible and drag the files from the !Sparkplug filer window onto the ram disc then change discs and copy back from the ram disc to the blank disc. This, of course, will not work if you cannot make a ram disc big enough to accommodate the uncompacted files.

If you have two discs, simply put the program disc in one drive and the blank disc in the other. Proceed as above, except that you will not be prompted to change discs since both are accessible to the computer at the same time.

• **Too many fonts** – If you have too many anti-aliased fonts, !Edit will crash with a 'Fatal internal error type=5'. So those of you who are purchasing the new onslaught of outline fonts should not put them all into one !Fonts directory.

• **VIDC parameters** – On the monthly program disk is a text file of all the VIDC and VDU parameters for the standard screen modes. This makes life a lot easier when defining your own modes, especially without the aid of an oscilloscope to monitor the video waveform, and a VIDC datasheet. It's much easier to tweak the existing numbers than to work them out from scratch! Mike Harrison.

• **Wimp programming** – If you get unexpected messages such as "Too many nested structures" when running a BASIC program in a Desktop application it may be simply because you have failed to allocate a large enough Wimpslot. Hugh Eagle

• **Z88 file transfer** – The Z88 can save files to disc. Ranger sell a battery powered disc drive which reads and writes 3.5" discs in 720k MSDOS format. The trouble is it costs as much as the Z88.

The Z88 does not insist on sending a line feed, see Printered.

Since the Z88 serial port uses XOn/XOff by default, a three wire serial lead will suffice if the Archimedes is using similar software. Be sure to short other handshaking lines. The simplest method of sending data to the Archimedes is to use:

```
*SPOOL file
*FX21,1
*FX2,1
```

and just print from the Z88. Make sure the last lines in the file being printed have *SPOOL *FX 2,0.

The next stage up is to use a communications package such as Hearsay and the Filer to send or receive files. There is a nice routine on the Data Store utilities disc which does the job using the Filer.

Lastly the best way of transferring data is to use the PCLink ROM and the Z88 filer that comes with Pipedream. Unfortunately PCLink comes with a Z88 to PC cable so some soldering is still required. Data transfer with PCLink is unnecessarily slow, a version of Kermit would have been more use and faster. Bruce Edelsten

(How about using the Archimedes-Z88 link that we supply for £35? Ed.) A

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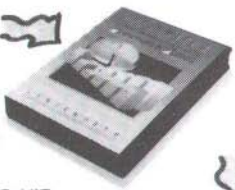

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ARC

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Comment Column

• **ARM3 machine?** – "Should I wait for Acorn's new ARM3 machine?" – A lot of people are asking whether it is worth upgrading their 310 or their 410 or whether it would be better to wait for Acorn's new ARM3 machine. In short, the answer is to go for the upgrade because the new machine will be too expensive and won't be available, as far as I can tell, until the end of 1990. (When did Acorn ever bring anything out **before** expected?!)

Piecing together various bits of information about the new machine, it looks like: ARM3 (obviously), 8M of ram upgradable, the speed of the ram is likely to be in excess of 8MHz (cf Archimedes' 4MHz), large internal SCSI drive, RISC-OS and Unix. I gather that an official announcement will come in the next couple of months.

So, it looks as if Acorn's new machine is not aimed at the enthusiast – with that specification, it could hardly be under £3000 and one person reckoned it that 'someone at Acorn' told him it would be nearer £7000. Neither is it aimed at education in general, though a number of higher education projects will no doubt make very good use of the huge amount of processing power that it represents.

Acorn are keen to get it taken up in what they call 'value added' applications. In other words companies with knowledge of a particular specialised market will decide that they could harness one of these new machines in their specialised area. They would then get hold of a computer to do development work on, having signed a non-disclosure agreement, and come up with a complete system consisting of computer, software plus, possibly, their own specialised hardware, selling the whole kit at several thousands of pounds.

Oh well, it would have been nice to have followed on from the Archimedes and bought one of these new machines but I think most of the non-institutional readers of Archive will have to be content with upgrading the 410/1. Still, if you think about it, a 410/1 with Atomwide's 8M ram with ARM3 plus a large Oak Computers' SCSI is, in itself, a very powerful system – it's just that we keep setting our sights higher and higher.

• **EFF Outline Fonts** – "Why do EFF (Electronic Font Foundry) claim to have hinted their fonts when they clearly haven't? I have NewLondon Light and Bold (normal and oblique although it should have been called Italic, since it is not a real oblique) and when they are rendered in a small size or on a low resolution (90/72 dpi Epson) for speed or in mode 0 they become illegible. Trinity etc don't do this only EFF fonts. Also 'likes' haves different thicknesses at small sizes which implies that they've not used scaffolds either.

Furthermore they seem to have introduced deliberate errors into the outline files to stop people trying to remedy the situation using the !FontEd application." Ian Griffiths

• **Language Forum comments** – Whilst agreeing with most of David's remarks on 'C' versus Pascal, I would like to relate to his comment that '... I feel that 'C' tends to tempt programmers to write impenetrable code while Pascal, being more wordy, is usually much easier to follow'.

I think that it is likely that a higher proportion of Pascal programmers than 'C' programmers have been formally trained in how to go about writing a large program, being a more 'academic' language, and that this might be the reason that their code is easier to follow. I personally prefer the Pascal/Modula-2/Ada style than that of 'C', but I think that the major problem is that many people writing programs have no real idea of how to go about the task – in whatever language.

It's not enough to say 'use structured programming' (for example), because that doesn't answer the question of how to divide a major problem into a series of smaller problems in the best possible manner. Another problem might be that many 'C' programmers have been 'initiated' into programming via interpreted BASIC, and not had it 'knocked out of their systems' in the way that many Pascal books and courses try to do.

Using an interpreted languages tends to encourage the use of short variable names, because of speed and memory considerations. Such considerations

are more or less irrelevant with compiled languages. It is very difficult to lose any such habit, especially if one has been using certain techniques for a long time.

I have recently worked on two high level language 'ports': One was written in Pascal, the other in 'C'. The 'C' program was a model of clarity and gave very few problems even though my knowledge of 'C' is very limited. The Pascal program was awful! The 'C' program has been well maintained since it was first written, in 1982. The Pascal program (c. 1984) is almost unmaintainable and still has many, many bugs. I cannot envisage anyone ever managing to get it to work properly!

In short, I think that the main problem is that of the programmer's skills, rather than the language. A skilled programmer can write a 'C' (or even assembler) program that is easy to follow and maintain, whilst a poor one can write the most awful Pascal program imaginable, that nobody will ever manage to maintain! Michael Ben-gershon

• **Laser Printers** – It is unfortunate that a review of laser printers can be imprecise. "Some features are faster on Postscript and some on LaserJets". Providing you are using outline fonts, as supplied with Acorn DTP and Impressions, Postscript printers will be much faster than LaserJets. When doing bit maps e.g. sprites or Paint, LaserJets will usually be faster. This is because most Postscript printers use the serial port and most LaserJets use parallel. The comparisons would be different if the Postscript was on parallel and the LaserJet on serial.

The aim therefore is to get a Postscript printer using the parallel port. (E.g. the Qume Crystalprint Publisher.) Unfortunately the only other reasonable contender I know about, the Fujitsu RX7100PS, does not work on parallel. I assume that this is a fault with !PrinterPS because the same printer works on the Archimedes as a Laserjet in parallel and on a PC as a Postscript printer. Bruce Edelsten.

• **MultiStore** – I have tried to use MultiStore for a costing system at work but have found that it leaves a lot to be desired in many ways. It's all very well to say that comparable software on other computers would cost £600, but if it is to be comparable, it needs to have much expanded documentation made into at least two parts: an introduction for first time users and an advanced reference section. As an example of the problem with the documentation, it took me a long time to get started because nowhere does it say how to get to the first blank record in a new datafile. The toolbox window gets in the way but if you remove it, how do you get at the next card? On top of this and other problems, it seems so slow. Is this really the best software you can get on a 32-bit machine? In the end, the combination of poor documentation, slow speed plus confusion and inflexibility with windows made me give up.

So I turned to the IBM world. A software salesman was happy to lend me a sample copy of DataEase with full documentation (3" thick!). This was a working copy of the software except that it was limited in the number of files it could handle. It was enough to enable me to try out my ideas of how I would implement my costing system. All Minerva would do was to **sell** me a sample copy of MultiStore for £15+VAT with very limited documentation. The program is a full working version except that it unexpectedly quits when it feels like it. How could I test my system on that? Sorry, Minerva, but you cannot compete in the business field without a real improvement in the software and the service. Ted Greagsby, Stockport. *(Edited down from a somewhat longer letter! Ed)*

• **PCDir and Beebug's External Disc Interface** – There have now been several reports of problems when using a Beebug external disc interface. The problem effects all drives, the symptoms being corruption of the first cluster of a file (i.e. first 512 or 1024 bytes). The solution is not to set the dip switch on the interface that inhibits the drive ready signal i.e. the setting that causes the interface to tell the Archimedes that the drive is always ready whether it is or not. Keith Sloan

• **Teletext Software** – I understand that the software supplied by Ground Control for their Teletext adapter will also work with the Solidisk adapter. I have version 1.10 of the Solidisk software which is bug ridden, does not work from the desktop and is difficult to use from a BASIC program. The very opposite comments apply to the Ground Control software which I would recommend to others in a similar position. David Owens A

16 bit SCSI

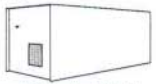
Oak's high speed 16 bit SCSI podule offers a new level of performance for the entire Archimedes range (including the A3000) with data transfer rates of up to 1.4Mb per second, a considerable increase over both ST506 and 8 bit SCSI controllers. Up to 2 Gigabytes of winchester storage may be fitted per machine, and seven SCSI devices including 4 winchesters may be attached to the card.

The card provides a new filing system 'SCSIFS', and an icon and filer for the Risc OS desktop. It can work in tandem with ADFS winchesters, and is compatible with the PC emulator. Low level (SWI) support is provided for other SCSI devices (e.g. tape streamers, CD ROMS etc.)

SCSI 4

Internal winchester kits are supplied as 'plug in and go' units, with all necessary cabling and mounting hardware, and external drives are supplied in sturdy metal cases, colour matched to the Archimedes, and have their own power supply and fan. External drives are also suitable for the A3000.

A comprehensive manual with easy to follow fitting instructions is provided with each system, along with a versatile formatting and utility program. Oak SCSI drives may be write protected for security.



All Oak SCSI winchester drives are subjected to rigorous quality control procedures, and each drive comes with its own test certificate.

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SCSI Card (SCSIARC)	*£199.00*	*300Mb (HDEXARC300SC)*	*£2845.00*
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16 bit SCSI Controller Card and High Speed Winchester Drives

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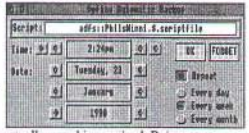
Oak SCSI tape streamers, available in 60Mb and 150Mb capacities are the ideal means of backing up large amounts of data. Using 'DC600' type data cartridges and high quality tape drive units, Oak tape streamers provide a reliable insurance against data loss. Multi-tasking, window software allows information to be backed up from any Archimedes filing system. Restoring data from tape is simple. A tree viewer of the directory structure stored on the tape, or a 'filer' type display can be shown in a window, and then the files to be restored can be simply 'dragged' with the mouse to the destination filing system, or even into an application!

Unattended backups may be triggered on a regular basis using the inbuilt automatic backup facility. Prompts to prevent accidental overwriting of existing files may be given during a restore as required.



Note: An Oak SCSI controller card is required. Drives are supplied with 1 free tape cartridge.

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SCSI Tape Streamer

New Products

Gigabyte Tape Streamer

For those requiring vast amounts of storage for archiving of data, the new Oak Gigabyte Tape Streamers offer the ideal solution. Storing 1 Gb of data on a single Digital Audio Tape cassette, these SCSI devices provide exceptionally reliable bulk data storage with low media cost. The tapes are accessed using our Risc OS Tape Backup software described in the Tape Backup column. Front panel controls and an LCD display allow access to facilities such as tape formatting etc. which may be performed off-line i.e. without tying up the computer.

1Gb Tape Drive (TSGIGA)	*£3999 (p&p £15)*
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Soundtracker on the Archimedes

Toby Simpson

Quite a few of you will have heard Soundtracker tunes on the Archimedes. For those who have not, this article will introduce you to a system that will provide access to some of the best tunes ever heard on an Archimedes. *(We've put some of them on the monthly program disc and some on Shareware 24. Ed.)*

Soundtracker is a public domain music generation program for the Commodore Amiga. It may sound strange to link this with the Archimedes but, because of the ARM's power, you can have access to five years' worth of quality digitised music available on the Amiga.

It is thanks to small groups of demonstration programmers on the Amiga that we have soundtracker music at all. The original 'Soundtracker' program was a commercial product. However, it was not particularly powerful and some groups of demo programmers thought they could do better. They did – a particular group called D.O.C. produced Soundtracker 2.1. This program was designer/programmer orientated, rather than musician orientated. This meant that it was easy for the non-musically minded person to create very good music tracks very quickly.

Because the DOC soundtracker was public domain, demo programmers all over the world made use of the supplied play-routines and it rapidly became the standard music package for the Amiga.

One of the particular differences between Soundtracker and conventional music programs is the ability to save what is called a 'Soundtracker Module'. This is a single file containing all the data necessary to reproduce the tune, including sample data. This was ideal for games and demos, as a module could simply be included in the program somewhere together with the play-routine. Soundtracker modules are now used in large numbers of computer games and in almost all demos available for the Amiga.

Now available on the Archimedes

So, where does the Archimedes fit into this? It is the only home computer, other than the Amiga, powerful enough to play Soundtracker modules. By using some of the additional features of the its sound hardware, it is possible to enhance these – the Archimedes has eight voices and each can have proper levels of stereo positioning, whereas the Amiga only has four voices, two on the right, two on the left.

Shareware disk number 24 contains a number of soundtracker modules and a soundtracker module play-routine written by Hugo Fiennes. This routine will play tunes in the background i.e. you can continue to do whatever you like while the tune is playing. It works by using interrupts – these are events that happen at particular times – to 'interrupt' current program execution, go and do something else and then return exactly where you left off. In this way, the soundtracker module player is totally transparent to RISC-OS. Indeed, RISC-OS is totally unaware that the tune is playing. The soundtracker module player installs itself on one of these interrupts, so that it is called at regular intervals. This ensures that the music can be played all the time though, as you will probably notice, if you really overload your computer, the occasional note will be missed or trashed.

If you want to stop the music, type the command *PLAYSTOP. If you try to use other programs that require the sound voice, you may notice that the soundtracker play-routine will do strange things. You are not recommended, for example, to use Maestro while playing a soundtracker tune! There are also three obey files on the disk called !Mono, !Stereo and !Amiga. These allow you to change the stereo effects in the tune. !Mono is the default. If you wish to listen to the tune in stereo, double click on the !Stereo file. This will change the stereo effect so that the voices are slightly left or right of centre. In my opinion, this is the best setup for the Archimedes. There is also one other file called !Amiga which makes the tune sound as close to what it would have sounded like on the Amiga as possible (i.e. closest to the original.). You can edit and change the stereo effects easily yourself – some nice effects can be seen by running a BASIC program such as follows, while a tune is playing:

```
10 FOR zoom%=-127 TO 127
20 OSCLI("stereo 1 "+STR$zoom%)
30 OSCLI("stereo 2 "+STR$zoom%)
40 OSCLI("stereo 3 "+STR$zoom%)
50 OSCLI("stereo 4 "+STR$zoom%)
60 NEXT
```

If you feel really adventurous, you could call some Amiga BBS's and download some modules yourself. If you want some numbers of Amiga BBS's or you're interested in Soundtracker modules, write to me at the address below and I'll help out if I can. If demand is sufficient, I'll produce more modules. I am planning to write an Archimedes version of soundtracker (i.e. to generate tunes) sometime in the future. Do contact me if you want more information on this. I hope to to make full use of the Archimedes' stereo effects and eight voices (RISC-OS as well) – we shall see! Toby Simpson, 37 Wingfield Road, Norwich, NR3 3HF. A

Competition Corner

Colin Singleton

The perfect puzzle this month – Perfect Numbers! This is probably the biggest challenge you and your Archimedes have faced in this Competition series.

A Perfect Number is one which is equal to the sum of all its divisors (except itself). The first two are 6=1+2+3 and 28=1+2+4+7+14. They are not easy to find.

The trick, of course, is knowing how to approach it. You should not start calculating all the factors of each number and adding them up. You should find all values of p for which 2^p-1 is prime. (Note that for 2^p-1 to be prime, p must itself be prime. This will save a lot of fruitless testing.) These numbers are called Mersenne Primes after the French mathematician Marin Mersenne who investigated them in the 17th century.

Euclid (of school geometry book fame) proved that if 2^p-1 is prime, then $2^{p-1}(2^p-1)$ is perfect. Euler, in the 18th century, proved that this method of search will find all even perfect numbers. No-one has ever found an odd perfect number and the general consensus of opinion is that there are none.

The first five perfect numbers and the first eight Mersenne Primes are within the integer arithmetic range of the Archimedes. The perfect numbers 6 and 28 are given by p=2 and p=3.

To proceed any further you need multi-length arithmetic. The real problem, however, is the size of the numbers which you are checking for prime. The usual technique of dividing by every odd number up to its square root soon becomes impractical. The solution was provided by Lucas in 1877.

He came up with the Lucas Series (for want of a better name) which starts 4 14 194 37634 1416317954 ... Each number is calculated as the square of the previous one, less two.

Lucas (in 1877) and Lehmer (in 1931) between them proved that if the (p-1)th number of this series is divisible by 2^p-1 then 2^p-1 is prime. These numbers do, unfortunately, soon become rather large. The next value of p we need to test is 37. The 36th Lucas number has about 2×10^{10} digits!

The Competition

In order to enter this competition you will have to devise some way of testing whether the (p-1)th Lucas Number is divisible by 2^p-1 without actually calculating the Lucas Numbers.

I have used Archimedes to find the values of p for the first 13 Perfect Numbers. (Historical note: the 13th Perfect Number was not discovered by anyone until the mid 1960's.) How many can you find?

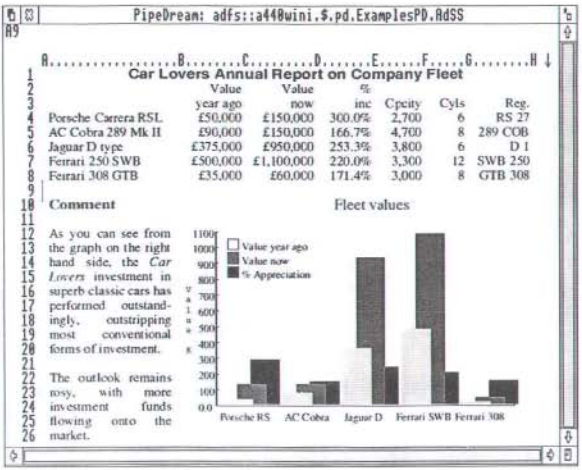
Entries please (a list of values of p on a postcard will do) and comments on Archive Competitions past present or future, either via Paul at NCS, or to me at 41 St Quentin Drive, Sheffield S17 4PN.

(This looks like a toughie, so this month I'll give a slightly larger prize – a £100 software voucher. Ed.)

Back to April

A footnote to the April competition (dates of Easter). The first 10,000 years are not typical of Eternity. If you have already tried this puzzle, have another look at it and try to determine the length of the full cycle. A

PIPEDREAM 3



PipeDream 3 breaks down the barriers between word processor, spreadsheet and database. You can include numerical tables in your letters and reports, add paragraphs to your spreadsheets, and perform calculations within your databases.

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All trademarks acknowledged. The chart in the screen shown above was produced by sending numbers from PipeDream 3 to Lingenuity's Presenter 2 and then loading the resulting graph back into PipeDream 3.

Colton Software, Broadway House, 149-151 St. Neots Road, Hardwick, Cambridge, CB3 7QJ, England.

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PipeLine

Gerald Fitton

Thanks again to all who have sent in a contribution to this month's PipeLine. Please keep sending them in to me at the Abacus Training address given on the inside back cover of Archive. If you have an extended example or a problem that needs a lot of explanation then please let me have it on disc so that there are no errors of interpretation and so that I can make it available to others more easily. All letters are read and all discs are returned but please be patient, the mail bag is large!

Free PipeDream3 demo disc

Some people have had problems with Colton's PipeDream3 Demo Disc as it appears on the Archive Monthly Disc. The problems are nothing to do with Colton but relate to the fact that, to fit them onto the disc, the files had to be compacted using David Pilling's Spark application. The first problem is that some of you were using an old version of Spark. If, instead, you use the version of Sparkplug provided on the same disc, all will be well. The remainder of the problems, I think, relate to the fact that people were unsure as to how to use Sparkplug. Paul has given a detailed explanation of this on page 11 of this issue.

When you have got the Demo Disc working, you can load any PipeDream file and you can import ASCII, View, ViewSheet, CSV, First Word Plus files or you can start up a new blank file and type into it a letter or a spreadsheet and see it on the screen. You can modify the files you load or calculate a spreadsheet of your own design but you cannot get a print-out nor can you save the amended version of the file. The SpellChecker facility and dictionary are not present.

Another Greek outline font

Andrew Provan recommends the Greek character set of outline fonts which comes with Impression. He also suggests that I purchase font cartridge number 22706B (an HP font cartridge for the Epson GQ-3500 which uses an HP emulator, I think he means).

CR + LF (or not) continued

Last month I said "Make sure that you use LF (line feed) and CR (carriage return) in such a way that everything works properly." I failed to say that the option to send a LF automatically after a CR is not in any of the pop-up menus but it is in the PipeDream printer driver which can be loaded into PipeDream for editing but must be Saved as a Tab file.

I use a *Status/*Configure which gives me 'No Ignore' (meaning that both LF and CR can be sent by software to the printer without having to use VDU 1 or similar software methods) together with printer dip switch settings that require both CR and LF to be sent to the printer (because each operates independently). PipeDream sends one CR through its printer driver at the end of every line (or more if you set the line spacing in the Print Page Layout menu to a value larger than '1').

From within the PipeDream printer driver you can choose whether PipeDream sends a LF as well when it sends a CR (by typing a 'Y' or 'N' into the appropriate slot). If your dip switch settings are such that your printer generates a LF automatically when it receives a CR then you must put N (for No!) in the PipeDream printer driver LF option. Having saved the modified printer driver, you have to reload it (from the Print – Printer Configuration menu) before the amended version becomes effective.

I do not know whether PipeDream overrides the *Status setting of No Ignore by using VDU 1 (I'll let you know when Colton tell me) but, if they do not use the VDU 1 technique then, if you want to send LF (character 10) you will have to set your *Status so that character 10 can be sent.

One more point is that the 'Save' menu has a 'Line Separator' option. My understanding is that this only affects the way a file is saved to disc and not how it is sent to the printer. Anyway, my default is LF by itself.

Catalogue your discs

I have received a disc from Francis W Aries which contains a most useful BASIC program. When you run it, it makes a catalogue of the files of any disc you put in (any) drive. The catalogue file includes the file name, file type (e.g. &DDE for PipeDream files), disc title, disc size and directory level.

This catalogue file can be loaded into PipeDream and you can add text describing the files or add key words in additional columns.

After this you can sort or search on any column for your keyword and so locate the file you are searching for. Yes! I know you could type up your catalogue into PipeDream 'manually' – what this BASIC program does is to save all the file details automatically for you. You can get a copy of this program either by buying the monthly disc from Archive (£3) or, if you send me a blank disc in a jiffy bag and a stamp, I will copy the program and send it to you.

Also on the disc is Francis' letter to me in which he makes suggestions how the program might be improved by those with the skill, time and inclination. This program seems to me to have a lot of potential uses so we shall all be grateful if someone (who understands BASIC enough to know how to make Tab or CSV files in BASIC) can tidy it up and add a few more features such as the full path name of the file.

Options

The 'Files' menu has a sub menu called 'Options'. One of those options is 'Wrap'. If you are doing some clever layout, I advise you to turn 'Wrap' OFF. Wrap is ON when the blue star shows in the small box. Turn 'Wrap' OFF by clicking once on the star. If you don't turn 'Wrap' OFF, text is automatically reformatted whenever it seems right to do so (e.g. the line gets a bit too long). This reformatting may completely wreck your very careful layout and make you rather cross.

When you do want to reformat, turn wrap back on and reformat only those paragraphs that you want to and then switch it off again.

Avoid disc swapping

If you don't have a hard disc but do have enough ram then, to avoid disc swapping with spell check auto, you should 'Lock' your dictionary into memory. Also you can load your macros into a ram disc. Stephen Gaynor suggests that you should arrange for PipeDream$Path to look for macros on the ram disc. Another use for the ram disc (if you have enough memory) is for a copy of the !System.!Fonts. This saves time too.

Extra function keys and macros

Shift + Ctrl gives a fourth set of function keys (make your own key strip) which can be included in a 'key' macro. The macro called 'key' is run automatically after the 'ini' (initialisation) file. If anyone has a disc version of how they use macros or the 'key' macro in particular then please let me have a copy for distribution.

Hard space

A 'hard space' is one which does not get split across lines. You can enter it from the keyboard by holding down <Alt> and typing 160 on the numeric pad (i.e. not the number keys across the top of the keyboard). Some people prefer to see their hard space and use, for example, the funny symbol *(which the Mac hasn't got! Drat! Ed.)* above the £ sign (character 164). This can be replaced by using 'Search and Replace' facility from the 'Blocks' menu. Search and replace accepts <Alt> + number in the dialogue box so you can replace the visible character with character 160 before using a RISC-OS driver or with character 32 (an ordinary space) if you are using a PipeDream printer driver. It is advisable to reformat after replacing with character 160 but obviously not if you replace with character 32.

Anagrams & subgrams

Last month I promised you a word with eight anagrams, including the original word, in Colton's dictionary. Try "pears". If you can do better (i.e. more than eight anagrams) then you can win a bottle of champagne from Colton. Please send your entries direct to: Robert Macmillan at Colton Software quoting your PipeDream registration number. For a mention in the PipeLine column, send me words with seven or more anagrams. Also, you can send me words with many subgrams and I'll publish the best.

Desk Top Publishing

This month's major feature was going to be on using PipeDream3 as a simple Desk Top Publisher. I had intended to introduce some of the simpler concepts this month and go on to more expert matters in a future article. However, I have received some excellent material (on disc!) from Maurice Edmundson which covers this ground and a bit more. This appears in the separate article which follows.

I have restricted my editing to making a few comments. These are in italics in square brackets.

Disc copies of PipeLine files

All files which are referred to in this column are available from Norwich Computer Services by buying their monthly disc. Alternatively, you can write to me at the Abacus Training address sending me a floppy disc (any format but, please, not blank – formatting takes time!) in a jiffy bag (available from stationers and the Post Office) together with a stamp. I will copy the files to your disc and return your disc in your jiffy bag. If you have a contribution to make (even if it is not as comprehensive as Maurice's) then send it in on your disc. All contributions are most welcome. A

Small Ads

• **A3000**, still boxed, £549. E-Type £14, E-Type Designer £10, Interdictor £24 (all o.n.o.). Phone Tim on 081–560–7310.

• **A310 + RISC-OS** with Computerware 4-slot BP £600. Computerware HD podule & cables £100. Gerald Chandler 0372–275263.

• **A310 base + RISC-OS**, dual 3.5" drives, 5.25" drive interface, 2-slot backplane, manuals, box, PC emulator, £700. Phone Mr A G Brend on 0276–22031.

• **A310 base + RISC-OS**, 2-slot BP, EMR Midi, Studio 24+. £600. Phone 0908–648894 evenings/ weekends.

• **A310 base + RISC-OS**, Acorn BP, PRM, Graphic Writer, 2nd internal 3.5", 5.25" buffer, £650 o.n.o. EMR 4ch I/O Midi £90 o.n.o. Phone David on 0284–761801 evenings.

• **A310 base + RISC-OS**. Immaculate condition. Boxed with manuals and welcome discs. £600. Phone Bob Nicholson on 0734 402404 (near Henley on Thames).

• **A310 colour** plus NL-10 printer, software, manuals, 50+ blank discs, £850 o.n.o. Phone Richard on 0495–773984.

• **A310M Colour**, RISC-OS, 4-slot back plane, MEMC1a, 5.25" disc buffer, I/O podule, Taxan printer, Zarch, FWPlus. £900. D. M. Fry 071–586–7708.

• **A310M Colour**, RISC-OS, 20M Winchester, 4-slot backplane, 5.25" Disc Buffer, Manuals, Software. No serious offer refused. Phone David Rowe on 0895–71815.

• **A310 colour**, loads of software and books, will deliver. £800 o.n.o. Phone 093–884–224.

• **A410/1 base** with 2Mb RAM, 40Mb hard disc, 5.25" interface & drive, PC Emulator, various applications and games £1300. Phone Adam Guile on 0229–873881 or 836202.

• **Acorn DTP** & Minerva Graphbox, both mint unregistered. Offers to Jason on 0533–704315.

• **Atari Portfolio** with 32k memory card and Archimedes interface £270. Phone Colin on 069–76–530 or fax 76–620.

• **Autosketch**, as new £40. Beebug's hard disc companion, new £20. Phone Ken on 0202–532216 (evenings).

• **Citizen MSP 55** Colour Printer, hardly used – surplus to requirements. £300 o.n.o. Phone Jackie Ballard 0935–32079 or 0460–74692.

• **Dabs Instigator** (unused) £36. Phone Alan on 0334–55772.

• **EMR Studio 24 Plus v2.0** brand new, unused and unregistered. £120. Phone Glenn on 0932–567614

• **First Word Plus (release two)** in original packing. £40 (inc p&p). Phone Donald on 031–336–4491.

• **PC Emulator version 1.21** £70 (unregistered), ProArtisan £65, First Word Plus £50. Phone Mr Lakofski on 076723–216 evenings.

• **Second drive for A310** £75, colour monitor £160, System Delta Plus £30, Sigmasheet £25. Phone 071–607–8325.

• **Watford Digitiser** – 12 months old. £180. Phone 0452–417697. A

DTP with Pipedream

Maurice Edmundson

A recent advertisement for Pipedream 3 illustrates how it can be used to produce pages with quite a sophisticated layout incorporating various styles of text, tables of figures and diagrams such as a bar chart. It is also possible to incorporate pictures, such as a photograph digitised by one of the small scanners now available from a number of Archimedes dealers. In other words, whilst lacking the more complex facilities to be found in specially designed DTP software, Pipedream 3 is capable of producing excellent displays if one is prepared to take a little trouble. The quality of the printout will of course depend on the printer but dot-matrix printers, especially the 24 pin variety, can usually produce an acceptably high standard of printed output.

Extra memory?

What tools are required to extend Pipedream into DTP? As mentioned above, a hand scanner is useful for pictures and photographs and a graph plotting package such as Presenter II or Graphbox is helpful for graphs, bar-charts and pie-charts. However, I believe the first priority is computer memory. Having purchased Pipedream 3, extra memory should be considered as the next best investment. My 400 series Archimedes came with 2M which has always been useful, but a short time ago I took advantage of Archive's low-priced ram to increase its memory to the full 4M. It is a tremendous asset and the icon bar can look quite dazzling with all the applications spread along its length but the elitism of a filled icon bar is not the point! The tools are all to hand, so that one can move from Pipedream to Draw or Paint, to plotting package or digitiser and to the RISC-OS printer-driver without difficulty. Furthermore, the spare memory will ensure that printing and screen-refreshing will take place as quickly as possible. High resolution digitised pictures, by the way, are very memory-hungry.

Page layout

In all DTP packages, the first task is to design the page layout. This is usually done by arranging a set of "frames" on the page which will later be filled with text or pictures. There are no frames in Pipedream but it is just as important to design a suitable ruler (I am using the term "ruler" to refer to the top line of slot headings, A,B,C, etc) to cover the layout that you have in mind. The column widths and the wrap width of each column should be related to the planned text, the columns of figures and so on.

On an A4 sheet in portrait position, I prefer the body text to traverse the whole width of the page rather than be arranged in (say) two columns. This is because RISC-OS fonts are proportionally spaced and if I use the justify option within Pipedream, I find that the spaces inserted to fill out the lines are unacceptably wide. Microspacing may help but I don't have this option on my printer. In general, therefore, I feel that the ragged right hand edge is preferable. With two or more narrow columns and each right hand edge ragged, it all looks rather untidy. Because of proportional spacing, when printed the body text will be narrower than if the system font had been used.

The Pipedream User Guide can be thought of as an A4 sheet in landscape position with two columns of unjustified RISC-OS text but because the text traverses each page, the ragged right hand edges are acceptable. True DTP packages are able to take care of this justification problem and produce columns or pages with straight edges on both sides. *[I don't seem to have this problem with RISC-OS drivers and justify ON. More on this topic next month. G.F.]*

Give it style

The second main requirement for DTP is a variety of font sizes and styles. These are provided by the RISC-OS fonts; Pipedream can make them easily accessible either through the "Print" menu or via the function keys. The latter are best used to provide the fonts for the main headings, leaving the global font (i.e. body text) to be set by the menu. Firstly, choose which fonts are to be used for headings. For example, suppose banner headlines are to be in 36 point Homerton Bold, main headings in 24x18 point Homerton Bold, sub-headings in 18 point Trinity Bold or 14 point Trinity Medium and body text in 10 point Trinity Medium. From the main menu select "Cursor" and then "Define function

key". Use the arrows to get Ctrl-Shift F1 in the upper slot, delete whatever is in the lower slot and type in the following: "@F:Homerton.Bold,36@". Click <select> and repeat for the other function keys in sequence, the commands for all the heading styles as above.

Thus <Ctrl–Shift–F2> will be "@F:Homerton .Bold,24,18@" making this font slightly narrower than it is high. By programming the function keys in this way you can instantly select a change of style within your document at the caret position merely by pressing Ctrl-Shift and the appropriate function key. You could add these styles to your function key card, calling them by name such as "Banner", "Main Head" and so forth. Note that the caret must immediately precede the words which are to be re-styled and unless changed again further along the line, the change will continue to the end of the slot (line). Before attempting to use any of these special styles, you must load the fonts into Pipedream and set the body text from the Print menu. In my example, above 10 point Trinity Medium would be chosen from the "Printer font" sub-menu. This is the font you would see on the screen. You will see some variation whenever you choose a heading style, but only when it is printed will it appear in its correct proportions.

For inserted fonts you will also see the command so long as the caret is on that line, but when the caret moves to another line the command will disappear. This is standard Pipedream practice. The command can be edited on screen in the usual way. Remember that the function keys provide temporary changes in style from the body text and at the end of the slot in use, the text will revert to body text. As a rule, main headings only occupy one line, i.e. one slot, so there is no problem. However, if a subsidiary heading occupied two or more lines (slots) then the function key would have to be pressed at the beginning of each line. Also remember that these function key settings are temporary and will be lost at switch-off. They can be preserved by incorporating them into the "key" file in !Pipedream, a technique which has been described in another article (also see User Guide p 324). Other layout commands can be inserted from the Pipedream menus in the usual way, for example centring a heading on the page or underlining a length of text.

Example – Memo

The first example "Memo", is for a Memorandum sheet for use in an office environment. Its main purpose is to show how dramatic large bold type faces can be. The main heading is centred and printed in 36 point Homerton Bold. The body text is Homerton Medium 12 point and the word "Subject" is printed in Trinity Bold 14 point. If the Company had a logo, this could be incorporated in the top left hand corner or wherever. The date can be left blank or as is done here, inserted as a macro (i.e. @D@) so that each time the sheet is printed, it will be dated correctly. The memo can be printed at the top of an A4 sheet (portrait) or printed twice on an A4 sheet to give two A5 (landscape) sheets. In the latter case, some adjustment to point sizes might be advantageous. A summary of the things to do is as follows:

1. Load Printer Driver DM. When it is on the Icon bar, click on the icon and then on the printer name in the window, bring into the slot the printer which will be used. e.g. Epson LQ-850 compatible, 360 by 360 dpi. In this example, since there are no grey scales involved, one can click on "monochrome" also.
2. Ensure the Fonts directory is available as described above. "Memo" was saved with all the font styles embedded. Load it into Pipedream and the various styles should be visible on the screen.
3. Select "Print" from main menu.
4. Select "Printer Configuration" and adjust the Printer type slot to read RISC-OS.
5. Select "Page Layout" to suit your arrangement, e.g. Top Margin 0, Left Hand margin 2, etc.
6. Select "Print", click on OK and after a few seconds the memorandum sheet will begin to be printed. How fast and how clearly will depend on your printer and how much memory you have available. With my 24 pin printer and with plenty of spare memory it takes about 25 secs.

Charts and diagrams in Pipedream

There is no need to load Draw or Paint onto the icon bar for what follows. The icons for the draw files in the directory will appear as white squares and they can be distinguished by their titles underneath. "Report" is a fictional financial report with a column of figures. (In this example it is not a spread-

sheet but it could easily be so and the end result would be the same.) The figures were fed into Presenter II which produced the desired bar chart. The bar chart was saved as a Draw file (one of the options provided by Presenter). Draw permits the diagram to be re-scaled when in "select" mode in the Toolbox (see Archimedes User Guide p 102/ 103 and 111). The bar chart was scaled to a suitable size for the document and saved as the Draw file called "Chart". "Report" was saved in System font. *[You can leave !Draw files at full size and scale them as they are inserted into the PipeDream file in the same way as fonts. For example the command "@G:Chart,95@" will make "Chart" 5% smaller. G.F.]*

1. Load "Report" into Pipedream in the usual way. You will see that the columns of figures begin at line 24 in columns B and C. <Tab> the caret into column D line 25.
2. Adjust the screen windows so that you can see the directory containing "Chart" as well as the report with the caret at line D25.
3. Drag the "Chart" icon into the Report window. It will load and position itself with the top left-hand corner at the caret position. The report is now complete with the figures and the bar chart.
4. Prepare for printing with !PrinterDM and the RISC-OS fonts as outlined above. Select the body text as follows: From the "Print" menu choose "Printer font". Use the mouse pointer to highlight Trinity medium then slide across to the "size" column and choose 12pt for height. Click select. (Width will adjust automatically to the same size. If a different width and height is required, click adjust on width first, then move down to height and click select on the height value.) The screen text will now change to this style. If you are manually choosing fonts with heights greater than 14pt for headings, choose "Insert font" from the Print menu, highlight Newhall Bold in the name list, slide to the size column and point to the bottom width slot which might have any figure in it. The caret will appear. Delete what is there and type in 18. Click adjust. Check that the bottom height slot is also ticked with 18 inserted. If not, insert it manually. Slide back to the highlighted name and click select on Newhall Bold. The command should now be visible at the caret position. When the caret is moved to another line, the heading will appear on screen in a larger style. For inserted fonts, the command must be visible at the caret positioned in front of the words to be modified or it has not been accepted by the computer. Repeat for the sub-heading using Trinity Bold 14pt. Now print.

Introducing Pictures into Pipedream

A digitised photograph is prepared in the file called "Photo". This has been stored as a draw file but, in contrast to a line drawing, it is composed of a mass of pixels arranged to simulate 16 shades of grey. It was created from a hand scanner at 200 dots per inch and "anti-aliased" to produce a reasonably detailed likeness on the screen and in the print. It was first saved as a Sprite file, further cropped to get rid of unwanted picture, and then loaded into Draw. Here it was scaled to the required size (taking care not to introduce distortion!) and saved as the Draw file "Photo".

Sprites and all pixel-based illustrations can be printed from Pipedream provided one precaution is observed. On p.453 of the Archimedes User Guide is set out the range of screen modes available. The full screen resolution is 1040 high x 1280 pixels wide, but the actual resolution varies from one mode to another. For example, mode 12 has a graphics resolution of 640 x 256. By simple division this means that the pixels used in this mode are composed of blocks of screen pixels measuring 2 across by 4 high. Now if a picture is to be printed correctly, it must use a mode in which the pixels form square blocks – otherwise the rectangular blocks of pixels will result in a distorted picture stretched in one direction. Thus pictures in Pipedream must be printed in "square" modes for example mode 9 (4x4) or better still, if you have a multi-sync monitor, mode 20 (2x2).

However, there is yet another snag when attempting, as I am doing, to provide examples for those with and those without multi-sync monitors. In the 4x4 modes, the pictures are printed four times as large in area as when in the 2x2 modes. But non-pixel parts of a diagram are not affected. In my example, I have framed the photograph twice using the rectangle option in Draw, with the outer rectangle having thicker lines. The frame will print

out the same size in any mode. But the picture inside it has to be a quarter as big for mode 9 printing as for mode 20 printing. However, the frame has the great advantage that it enables the picture to be correctly aligned on the page and in line with the text. I have had to prepare two examples, Jane/20 and Jane/9 for use with the mode you are going to use. Note that the small picture in mode 9 is positioned at the bottom left hand corner of the frame.

When using a dot-matrix printer to print a photograph, the best result is not always obtained by using the highest resolution of printing. Thus 360 x 360 dpi can put too much ink on the paper resulting in a dark picture lacking in detail. Some experimentation with other print resolutions such as 180 x 180 dpi or 360 x 180 dpi is necessary in order to arrive at the optimum result. Don't forget than when printing pictures, the "monochrome" option in the Printer DM window must not be highlighted. The Jane files have been saved with the RISC-OS codes embedded and the photograph already installed. It is meant to simulate what a teacher or parent might produce for reading or writing activity with a young child. The body text is 18pt Homerton Medium and the line spacing set from the "Print" menu is 20pt. These commands may give an odd appearance on the screen but ignore them and the print should appear correctly. Remember, all the setting-up was done in system font, so there are no distractions at this formative stage.

1. Make sure the RISC-OS fonts are loaded.
2. Load the Printer Driver and set it for 180 x 180 dpi with the monochrome option not highlighted.
3. Choose a "square" mode e.g. mode 9 or mode 20.
4. Load the appropriate "Jane" file and print.

I have occasionally had trouble with printing out the first line of a document. Sometimes the printer may only give two passes when it should be three and the first line is therefore not quite perfect. I get over this by starting RISC-OS printing from line 2 leaving line 1 in Pipedream a blank line.

Another tiny "bug" I have found is that printing using outline fonts and Printer DM will only take place if the default screen of a white background and black letters is used. I usually use a dark grey background and white letters but this will always give the error message "wrong number of output bits". So when using RISC-OS fonts I have to change my screen to the default one.

Finally, during the preparation of a document, it is best to use the system font until the very last minute before changing to the various RISC-OS fonts. Once these are incorporated, screen refreshes are slowed down considerably as in all DTP packages. Once the change to RISC-OS has been made it is essential to reformat the body text throughout the document before printing. The reformatting will be seen on the screen.

(Note: Before the examples can be run, the Fonts directory, version 2.42, must have been "seen" by the computer and be accessible to it. It must be either on a hard disc, or a second floppy. If only one floppy is available, a good deal of disc swapping will be required. In the latter case it would probably be better to copy the examples onto a separate disc along with the Fonts directory.) *[If you have enough memory available you can avoid disc swapping by creating a ram disc and transferring your !Font directory to that ram disc. G.F.]* A

Introduction to C – Part 7

Chris Dollin

In this month's article, I shall discuss two topics in C programming – the use of random numbers and the question of evaluation order. Both of these topics have been inspired by letters from readers – please keep it up!

The Mystery of the Missing bbc_rnd

If you turn to page 253 of the Release 3 manual, at the bottom you will find a mention of *bbc_rnd*, which "returns a random number", presumably in the same way as *RND* does in BASIC. However, if you write a program to use *bbc_rand* (not forgetting to *#include "bbc.h"*), the linker politely rejects the program saying that *bbc_rnd* is an undefined external. (Thanks to Mark Taylor for pointing out this problem.)

Using !Edit (or Twin) to look at the RISC_OSLib.o file allows you to see the names of the routines that are available (as well as lots of gibberish, which is the object code): *bbc_rnd* is conspicuous by its absence. I wrote to Acorn about this and received a helpful reply from Stuart Payne.

Apparently *bbc_rnd* has never actually been implemented in any of the Acorn C systems. Because programs are written primarily for the desktop, the bbc functions are rather a backwater which (as Stuart put it) "accounts for, but does not excuse" the oversight. He also informed me that *bbc_inkey* does not return the key pressed but the elapsed time (presumably once the key has been pressed) – to get the effect of the BASIC *INKEY* you must call *OS_Byte*.

"Well" you cry, "that's all very well, but where am I going to buy my random numbers?". Fear not: if you turn to page 193 of the manual (or K&R II page 252) you will find a description of *rand* which takes no arguments and delivers an integer in the range *0* to *RAND_MAX*, which is guaranteed by the Standard to be at least 32767 (and is 2147483647 in Acorn C). (*rand* was also mentioned in Part 2 of this series – in Archive 3.2 p54.)

How can we imitate the action of *bbc_rnd* using the ANSI function? As a first approximation, we might write:

```
#include <stdlib.h>
#include <assert.h>
int our_rnd( int limit )
   {
   assert( limit != 0 );
   if (limit < 0)
      {
      srand( -limit );
      return -limit;
      }
   else
      return rand() % limit + 1;
   }
```

If *limit* is negative, it is used to set the seed of the random number generator using the library procedure *srand*. If it is positive, a number in the range *1..limit* is returned. Note that we cannot duplicate the behaviour of BASIC's *RND* for *0* and *1*, as a C function must consistently deliver an *int* or a *float* and cannot choose between them at run-time. In contexts where integer results are appropriate having *our_rnd(1)* deliver *1* is useful, for example, when picking an item out of a collection – no special case is needed for a collection with one element. (A general programming principle is "avoid special cases". As with all general principles, it has a rider... "unless it's better not to".)

A handy way to generate seed values is to *#include <time.h>* and to incant

```
our_rnd( -(int) time( 0 ) );
```

or

```
srand( (int) time( 0 ) );
```

time delivers an encoding of the calendar time. We cast it to *int* as it may be of a bigger type (although it isn't on the Archimedes). The argument is a pointer to another place to store the result or a null pointer (*0*) if we don't want it stored anywhere else.

Of course one might well decide that having one function to do two different jobs (setting the seed and delivering the the random number) is not very clean design, and just call *srand* directly to change seeds and finish up with

```
int rnd( int limit )
   {
   assert( limit > 0 );
```

```
    return rand() % limit + 1;
    }
```

Speeding it up

Division is pretty slow on the Archimedes (compared to things like addition, even multiplication), so we might want to limit ourselves to *limit*s which are powers of two, so that division can be done by masking. If *limit* is *2**k* (note: "**" is not a C operator) then *limit-1* is a mask for numbers in the range *0..2**k-1*, so we can write

```
int rnd_power_2( int limit )
    {
    /* limit must be a power of 2 */
    assert( limit > 0 && ((limit &
                (limit - 1)) == 0) );
    return (rand() & (limit - 1)) +
                                    1;
    }
```

The second half of the *assert* expression tests to see if *limit* is a (positive) power of 2 – you might like to see how it works.

Of course, if we really want speed, we can arrange that our random-number "functions" are implemented as macros:

```
#define rnd(limit) (rand() %
                        (limit) + 1)
#define rnd_power_2(limit)
      ((rand() & (limit - 1)) + 1)
```

I've removed the *assert*s for two reasons. Firstly, since we're turning to macros for speed we're presumably out of the debugging stage, thus they should no longer be necessary. Secondly, and more importantly, if the parameter to one of the *rnd*-functions has side-effects, leaving the assertion in will cause that parameter to be evaluated more than once, with unfortunate effects.

From previous articles, you will see that the natural place for these macros (or declarations of the corresponding functions) is a header file called (for example) "rnd.h", with a C file "rnd.c" containing any supporting code such as the bodies of the functions.

Macro macros and the comma operator

If we wish nevertheless to provide the protection of *assert* to this in-line code, we must arrange to evaluate the parameter expression exactly once and store its result in a variable. As C provides no way to declare a variable local to an expression, the best we can do is to declare a global temporary variable, say *rnd_limit* and use that:

```
extern int rnd_limit;
#define rnd(limit) \
    ( \
    rnd_limit = (limit), \
    assert( rnd_limit > 0 ),
    rand() % rnd_limit + 1 \
    )
```

(*rnd_power_2* is done similarly.) There are two new features of C here. One is that macro definitions can be extended over several lines by ending all but the last with the backslash character "\". (This is not a licence to write arbitrarily long macros: an implementation is permitted to restrict the lengths of such "logical lines" to as little as 509 characters.) The second is the comma expression: if *E1* and *E2* are expressions, then *E1, E2* is an expression that evaluates *E1*, throws away the result, and then evaluates *E2* – returning that value as its result. Clearly it is only useful if *E1* has some side-effect, such as performing an assignment. The comma operator associates to the right so

```
E1, E2, E3 means E1, (E2, E3)
```

i.e. it evaluates *E1* and *E2*, throwing away their results and then evaluates and delivers *E3*. In our *rnd* macro it allows us to assign the limit to *rnd_limit*, check that it is valid and compute the result – all in one expression.

Note that there must be a definition of *rnd_limit* somewhere (for example, in "rnd.c") and that you must warn other users of these definitions not to use *rnd_limit* themselves. Also note that the use of global variables in this way will slow down programs as the code to access them is slower than that to access local variables. When assertion checking is turned off (because the preprocessor variable *NDEBUG* is set) a version of the macro that avoids the now-unnecessary saving of the argument should be used.

Be warned. The commas in the argument lists of functions are not comma operators and make no promises about order of evaluation – see the butterfly below for more details.

One problem with the approach suggested above for generating random numbers in a given range is that some random number generators are not as random as one would like. For example, some generate alternately even and odd values! For a particular application it may well be worth checking that the random-number generator generates "random enough" values and writing your own if it does not. Writing random number generators is not as easy as you might think – consult a good algorithms book for information starting (for example) with Knuth Volume 2 or Sedgewick.

The butterfly strikes back

You may recall that in the second article of this series, we said that some programs – for example those that contained expressions with more than one side-effect on the same variable – could exhibit undefined behaviour, which meant that they could do anything (including turning the computer into a butterfly). Andrew Ling of West Sussex spotted a butterfly lurking in the very next article: page 42 of the December issue contains the statement

```
give_card( &player[i], pack[i++] );
```

There is only a single side-effect on i in this expression. However, as noted above, the order of evaluation of the arguments to a function is not defined and this program relies on them being executed left-to-right. It works (by coincidence) on the Archimedes but will not work on many other machines – which evaluate arguments right-to-left (to make it convenient for passing arguments on the stack when the number of arguments the function expects is not known). The code should be written as

```
{ give_card( &player[i], pack[i] );
                                  i++; }
```

or

```
give_card( &player[i], pack[i] ),
                                  i++;
```

to suit your taste.

In general, C makes no promises about the order of evaluation within expressions, and programs which rely on such order will exhibit undefined behaviour. However, there are some important exceptions – without them, programming in an imperative language like C would be impossible – and I'll mention them here.

Although not an expression operator, the statement sequencing operator (i.e. writing one statement after another) guarantees that all the side-effects of the earlier statements are finished before the next starts. (Without this guarantee, you'd hardly be able to write anything.)

The comma operator guarantees that its left operand will be evaluated before its right operand.

The "||" (logical OR) and "*&&*" (logical AND) operators both evaluate their left operand first and only evaluate their right operand if necessary to determine their result.

The conditional expression *E1 ? E2 : E3* is the expression equivalent of the if-then-else statement. It evaluates *E1*; if it is true (i.e. non-zero) it evaluates (and delivers) *E2* – otherwise it evaluates (and delivers) *E3*.

No other operators define an order of evaluation: in particular the assignment operators, although they assign from right to left, need not evaluate from right to left. It is very easy (as above) to forget that the order of evaluation is not defined and some very tricky bugs can emerge when porting programs between different machines – or indeed different compilers for the same machine!

A useful book on these (and other) pitfalls is the one by Koenig.

[A note for those of you who like to look at the code generated by compilers (use the -S option on the command line): a C compiler is permitted to generate any code it likes so long as it behaves "as if" the rules above were satisfied. Consequently it can juggle code for maximum speed if it can prove that the program can't tell the difference.]

Exit

Keep those problems and techniques coming in! In next month's article, I shall address the issue of dynamically allocated storage – how to use *malloc* and *free*.

Pointers

Knuth: "The Art of Computer Programming, Vol 2: Semi-numerical Algorithms", Addison-Wesley.

Koenig, Andrew: "C Traps and Pitfalls", Addison-Wesley.

Sedgewick: "Algorithms" (2nd Edition), Addison-Wesley. A

Designed, & typeset

IMPRESSION

Impression is more than a word processor. It can handle all aspects of the final printed result - the text, line graphics, photographs, company logos etc. Yet it can still be used to bash out a single page of text as well as any 'simple' word processor. It is a document processor.

RISCOS

Impression is one of the first products to take full advantage of the new multi-tasking WIMP based operating system for the Archimedes, so it is simple and intuitive to use - long gone are the days when users had to remember commands, or codes for each operation. Only five main menu options control everything within Impression.

The program is written in ARM assembler so it is very fast and very responsive, and uses the minimum possible RAM space.

Frames

Impression is a frame based page layout system. All objects on the page are held within frames which may be positioned freely anywhere on the page. Frames can contain text or graphics, they may overlap, and may be transparent or have any coloured background. They can have a variety of borders displayed around them and may be arranged in columns to create multi-columned text.

Text frames may be linked to other text frames (even on subsequent pages) so text will automatically flow from frame to frame and page to page. Since Impression has been designed primarily as a word processor, it is important that users can enter text unhindered. Therefore frames and pages are created automatically as text flows out of a frame, so that while text is being entered you do not have to worry about creating new frames or pages.

Graphics frames may contain any sprite (for example images from Scan-Light) or any Draw file. All graphic frames may have the picture scaled within the frame to any degree. In addition the aspect ratio of pictures can be controlled and even locked to any required value.

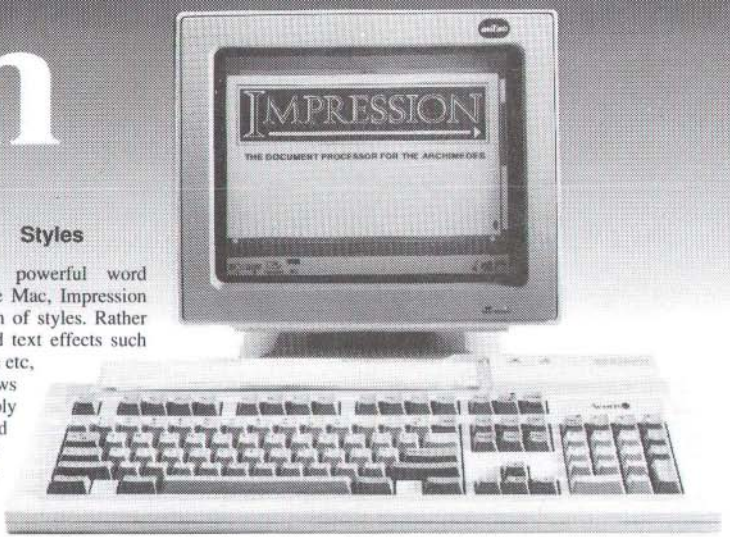
Windows

Impression can handle up to 16 documents in memory at any one time, each being viewed in one or more windows. Each individual view may be scaled as required so that, for example, one view may be at 100% while another window shows the same document scaled to 20% so showing a live 'mini' view or multiple page 'thumb-nail' views. This mechanism also allows two different parts of a document to be edited without the need to scroll between them. Impression can display its pages within the window as side-by-side left/right pages, and as vertically arranged pages in a more word processor-like fashion. There is no need to specifically turn over the page, thereby overcoming a limitation of traditional DTP systems.

Spelling checker

Included with Impression is a 60,000 word spelling checker providing some of the most advanced spelling facilities. Check-as-you-type, user dictionaries, ignore dictionary, crossword and anagram solving and an intelligent 'guess' feature are included. Other related dictionaries control automatic abbreviation expansion as you type, and a hyphenation exception dictionary for precise hyphenation control over and above the normal automatic hyphenation.

arranged on



Styles

Like the most powerful word processors on the Mac, Impression supports a system of styles. Rather than having fixed text effects such as bold, underline etc, Impression allows the user to apply any user named style to any part of the text. This style may be defined and re-defined at any time to represent any combination of stylistic effects. So for example one style, perhaps called 'heading', may specify text to be in a Times font, one inch high, in italics and centered. This style may then be applied to any region of text with one key-press.

Printing

Included are the latest RISCOS printer drivers for Epson compatible 9 and 24 pin printers, and LaserJet compatible laser, ink-jet, and PostScript printers. These printer drivers ensure the output is to the maximum resolution the printer can manage. Impression also supports 'text mode' draft printing so text may be output as fast as possible using the printer's character set. The user therefore has a choice between fast, text only printing or high quality text (any font, any size) and graphics printing.

Impression comes with a 'no quibble' money back guarantee when purchased direct from Computer Concepts.

This advert was designed, entered, laid out and edited on Impression. All logos were created in Draw and imported into Impression frames. The pages were then 'printed' via the PostScript printer drivers to disc. This disc file was then sent directly to a Linotron photo-typesetter, which output the final camera ready artwork. The studio photographs were then pasted over scanned versions.

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Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. (0442) 63933

SCSI Column

Paul Beverley

Gigabyte TapeStreamer

Firstly, a few more details about Oak Computers' 1 Gigabyte SCSI tapestreamer (£3999 + VAT or £4030 inc VAT through Archive). It uses a tiny R-DST (rotating-head digital storage tape) cassette tape 73 x 54 x 10 mm, i.e. **smaller** than an ordinary cassette tape! Even though I have seen it, I still find it difficult to believe that such a huge amount of data could be packed onto such a small data tape.

The data rate when it is streaming is 146 kbyte/sec. The average access time to anywhere on the tape is 30 second. Error rate is 1 bit in 1015 which represents one bit every 125,000 tapes. The unit has front panel controls and LCD display to allow for such things as off-line tape formatting etc. Data is stored with an index to provide near random access. It is supplied with a SCSI podule and !OakTape software which allows you to do all sorts of selective backups and restores based on various criteria.

Magneto-Optical drive

The very latest technology in mass storage has been harnessed by Oak Computers in their magneto-optical drives. These are read-write drives unlike the read-only CD-ROM's. The good news is that these are robust removable media which store 560 Mbytes per disc, 280 Mbytes on each side, accessible separately. They say you can spill your coffee on them (not on the drive itself though!) and just run it under the tap to clean it off. The, relatively, bad news is that when reading they are only about as fast as an Acorn 20M drive (about 300 kbytes/sec) and on writing, where you have to blast it with a laser, it is only 100 kbytes/sec. The average access time is 66 msec. The price is £4,800 +VAT (£4840 through Archive) and the individual cartridges cost £300 + VAT (£310 through Archive).

A3000 SCSI interfaces available?

Lingenuity's internal mini podule for SCSI are at last coming off the production line. However, they have such a big back order list that until that is cleared, they will not be freely available.

SCSI problems with Minerva software

Minerva write... When using some Minerva products such as System DeltaPlus, Gammaplot or SigmaSheet from a SCSI hard disc, you may come across some problems.

To use one of these programs on a SCSI hard disc, you should have a RISC-OS machine.If your program is pre v2.00 you should make a backup and convert it using the RISC-OS support disc. The software may be copied to the hard disc as follows (use the desktop drag mechanism to copy the files):

Copy the contents of the library directory to the library directory on the SCSI hard disc.If you do not have a library directory on your hard disc you should create one using the New Directory option from the desktop.Copy everything else wherever you like.

The most common problem is where you get the error message 'Module must be on the disc'.This means that the program you are using has not been able to find the modules that it requires.

To cure this problem you should try the following:

Configure the Filing system to SCSIFS and the drive to :4 with the following commands:

```
*CONFIGURE FileSystem SCSI
*CONFIGURE Drive 4
```

Then press <Ctrl-Break> and try again. If it still doesn't find the modules, you should make sure that the library is configured correctly by typing:

```
*LIB :4.Library
```

Problems with Hearsay on SCSI drives

At least two readers have had problems getting Hearsay to work properly on the SCSI drive (whereas I have had no problems with what purports to be exactly the same version!). One of them, Michael Ben-gershon, has created a patch to get round the problem. He writes...

As far as I can tell, Hearsay+SCSI has problems with having the root directory on the hard disc or the !Hearsay directory visible on the desktop when it is entered. This 'fix' ensures that these directories are closed **before** Hearsay is entered. The root directory is re-opened when Hearsay is exited. You might wish to remove the line that does this (towards the end of !Run2).

The hard disc name is referred to in a couple of places. If your hard disc is not named 'HardDisc4' you should alter these two lines. Each of them is preceded with a comment that points this out.

Note that the file !Hearsay.SetBuffer should be 'fed' into BASIC and then saved as a BASIC program, before it will work!

The following file should replace the !Run file in the !Hearsay application directory. The others are additional files.

```
| >!Hearsay.!Run
| Startup file for Hearsay
RMEnsure WindowManager 1.00 Error
            Hearsay needs a newer Wimp
IconSprites <Obey$Dir>.!Sprites
Set Alias$@RunType_D64 Run <Obey$Dir>
                              .!Run %%*0
Set Hearsay$Path <Obey$Dir>
| You might have to change the hard
    drive name in the following line!
Filer_CloseDir SCSI::HardDisc4.$
| The following command has been
        written to avoid the 'bug' in
| 'Filer_OpenDir' that insists on
        being given the full pathname
                            literally
| (no system variables are allowed!
      (Hint from Phil Colmer, Acorn).
Set Alias$fool Filer_CloseDir
   <Hearsay$Path>|MUnset Alias$fool|M
fool
Run <Hearsay$Path>.SetBuffer
```

```
| >!Hearsay.!Run2
RMEnsure MemAlloc 0.00 RMLoad
        <Obey$Dir>.Resources.MemAlloc
SpriteSize 64K
RMAFree 32K

Set Hearsay$Temp "%0"

Set Count 1
IF (Hearsay$Temp RIGHT Count) LEFT 1
    <> "." THEN Seteval Count Count+1
IF (Hearsay$Temp RIGHT Count) LEFT 1
    <> "." THEN Seteval Count Count+1
IF (Hearsay$Temp RIGHT Count) LEFT 1
    <> "." THEN Seteval Count Count+1
IF (Hearsay$Temp RIGHT Count) LEFT 1
    <> "." THEN Seteval Count Count+1
IF (Hearsay$Temp RIGHT Count) LEFT 1
    <> "." THEN Seteval Count Count+1
IF (Hearsay$Temp RIGHT Count) LEFT 1
    <> "." THEN Seteval Count Count+1
IF (Hearsay$Temp RIGHT Count) LEFT 1
    <> "." THEN Seteval Count Count+1
IF (Hearsay$Temp RIGHT Count) LEFT 1
    <> "." THEN Seteval Count Count+1
IF (Hearsay$Temp RIGHT Count) LEFT 1
    <> "." THEN Seteval Count Count+1
IF (Hearsay$Temp RIGHT Count) LEFT 1
    <> "." THEN Seteval Count Count+1
IF Hearsay$Temp<>"" THEN Seteval
          Hearsay$Call (Hearsay$Temp
            RIGHT(Count-1)) ELSE Set
                     Hearsay$Call ""
WimpSlot 0 0
Echo<22><12>
Echo<23><1><0><0><0><0><0><0><0><0>
Run "<Hearsay$Path>.Resources
                          .!Palette"
WimpSlot -min 500k -max 500K
Set SCSIFS$Path SCSI
SetEval Hearsay$Run "Run<Hearsay$Path>
          .!RunImage "+Hearsay$Call
Echo <Hearsay$Run> { > <Hearsay$Path>
                              .temp }
SetType <Hearsay$Path>.temp FEB
Obey <Hearsay$Path>.temp
| You might have to change the hard
    drive name in the following line!
Filer_OpenDir SCSI::HardDisc4.$
Fx 138 0 13
```

```
 10 REM >!Hearsay.SetBuffer
 20
 30
 40 Mode12$=CHR$(22)+CHR$(12)
 50 CursorOff$=CHR$(23)+CHR$(1)
                 +STRING$(18,CHR$(0))
 60 cr$=CHR$(13)
 70
 80 *Fx 138 0 204
 90 A$="Run <Hearsay$Path>.!Run2"
          +Mode12$+CursorOff$+cr$
100 FOR pointer%=1 TO LEN(A$)
110 SYS"OS_Byte",138,0,ASC(MID$(A$
                      ,pointer%,1))
120 NEXT
```

First Word Plus Column

Stuart Bell

Super-Light Text? – Had Stuart Boutell's letter arrived a week or so earlier, I might have been tempted to pass on his first bug in the form of a spoof text-style, appropriate for April 1st. Stuart has found that FWP2 implements super-light text (invisible, actually) in the following manner: a) Type a few lines of text into an empty FWP2 window, moving the cursor back to the top of the page. b) Move the window down (by the title bar) so a few lines of your text are below the screen bottom, and the cursor is in the visible section. c) Delete a line using <F8>. d) Hey presto! The text that should have moved up from below the screen bottom is invisible! Hence, 'Super Light' text.

Stuart suggests that this definite bug is caused by FWP2's use of the WIMP's 'copy a rectangle' routine and points out that the work-around is to use <F12> and <return> to restore the vanished text.

Another bug/feature that he has found is that if you quit FWP2 using the Task Manager without saving an unsaved document or without saving an altered supplementary dictionary, FWP2 attempts a desktop shutdown (as does, apparently, Acorn DTP.) It's true! The dreaded * prompt suddenly appears and all other multi-tasking applications are gone for ever. Quite why you'd use the task manager for this purpose I'm not sure, but it's certainly a nasty bug.

Finally, Stuart complains that the 'non-undo-able' <delete line> key is next to the <reformat> key, about the un-RISC-OS printer driver system which FWP2 has retained from FWP1, and also that when !1stChars is loaded – if the shift key is pressed when the pointer is over a particular character – that character is inserted in the text. He has modified line 60 of the !1stChars utility so that the right <alt> key (code -9) accesses the character, as it is so easy to accidentally press <shift> by itself when entering text. This isn't a bug but a clearly documented feature of !1stChars. Thanks to Stuart for his bug warnings and comments.

Correspondence writing – updated

Glyn Emery has written in with an update on his original note about using 1st Mail for ordinary correspondence, in the light of a hard disc, RISC-OS and release 2 of FWP.

He writes, "As advised in the release-2 manual, I naturally keep the programs on hard disc in a directory "1wp" and I keep my letterheads there too (of which more later). However all the actual letters and addresses I keep on a floppy disc named "1wp" in directories called "letters" and "addresses" respectively. That way I don't use up any more hard disc space and avoid having to back up the hard disc.

Now for the changes to my letterhead file. This is the file I use to merge from. After my name, address and telephone it contains the following:

```
                                longdate
input "address file name?",
    address
input "text file name?", text
includefile adfs::1wp.$.addresses
                                .address
Dear
includefile adfs::1wp.$.letters
                                    .text
includefile adfs::1wp.$.addresses
                                .address
```

1stWord+ and 1stMail are both installed on my icon bar, so when I have written a letter and saved it on floppy I simply drag the letterhead icon on to the envelope icon and give the filenames of the desired letter and address when requested. There is a page break before the second printing of the address. The printer is made to pause at page breaks so that I can remove the letter from it and get the second address printed on the envelope (or sticky label).

What do I think of release 2? It is difficult to disentangle its advantages and disadvantages from those of RISC-OS and a hard disc. I never had much trouble with bugs in release 1 and I never tried to use it with RISC-OS. I shed no tears over the absence of a "save and quit" command or the loss of the "bak" facility which for me always overwrote earlier letters and kept only one stale version of the current letter. The main advantage of the new release seems to be that it allows you to organise files the way you

want. And of course you no longer need Steve Hoare's IntModule which really pointed up an oversight in the design of release 1."

I am personally not keen on using floppies for text, since once the first disc is full, trying to find an old letter or address puts us back in the situation which made a hard disc so attractive in the first place. Also, hard disc back up is pretty painless with the !HDBackup application from the Archive PD discs. Finally, there's speed. With a one-page letter there's little practical difference, but if I've shelled out £500 plus on an Oak 45M SCSI system (and worth every penny) I want to use it every time!

Thanks to Glyn for his note on using 1stMail, comments on Release 2 and especially for submitting his letter on disc (hint, hint).

Odds 'n' Ends

Christopher Bontein wants to be able to modify the default settings for such things as 'swap headings' and 'alternative left margin' in the Print File Box on FWP Release 1. He's tried altering the resources.1wp.template file with no success. From inspecting that file I think that references in it to relevant field names are simply text entries that FWP1 uses, so that foreign language versions need only change the template file and not the main program. I don't really want to reload FWP1 on my system if I can avoid it. Can anyone else help, please?

Requests for copies of Stephen Mansfield's KX-P1081 printer driver (see last month's column) have been hitting my doormat on a regular basis. A reminder that a formatted disc and return postage is all that's needed if you want it. *(Also on monthly program disc. Ed.)*

To end, the usual reminder that I'm at 56 Crescent Drive North, Woodingdean, Brighton BN2 6SN (no phone calls, please), and would be glad to receive hints, problems, wishes and cries for help by about the 15th of each month if you want to make the next issue. A

Caverns – a complicated game

Philip Green

Caverns, £29.95 from Minerva, is a very tricky game to play and Minerva are certainly not exaggerating when claiming that "patience and dedication are needed if this game is to be completed".

You have to steer a spaceship with just one rocket about the screen. Gravity pulls you down and if you touch the walls, floor or ceiling anywhere other than at a landing-pad, your vessel disintegrates. The spaceship's 'cannon' fires in the opposite direction to that of the rocket so, to shoot anything beside you, you must give a burst with the rocket, rotate the spaceship towards the target, fire the cannon and rotate back again so that you can use the rocket in time to avoid crashing to the ground. So this is the first problem, to navigate your way around the screen. Some of the passages are very narrow and moving horizontally requires intense concentration and lots of practice. The different levels of the game (fifteen in all) each consist of an area equivalent to sixteen times the visible screen and yet Minerva have crammed all of this into 427k of disc space.

Once you have got the knack of navigating your vessel you must set about the actual task of 'saving the world'. To do this you must penetrate deep into enemy territory and destroy the nerve centre. In true Minerva fashion, little is explained, most of the plot being left to the player to discover. I was given a special review copy including a map and passwords to the various levels on the strict understanding that these were not to be published. Someone else, however, playing on my computer tried to guess passwords and came up with the word "caverns". The game accepted this although "Caverns" was not on the list of passwords supplied!

The graphics are very smooth and clear. Sound is used sparingly but to good effect. The whole application directory was simple to move to SCSI hard disc and ran from there without modification. Minerva advise using <ctrl-break> before and after playing the game and I have seen some very strange things happen when forgetting to do so before loading the game.

All in all, I found this a very playable game though extremely tricky. Definitely worth anyone's pocket money. The game is marketed for both A3000 and Archimedes machines but will presumably require at least one megabyte of RAM. A

Help!!!!

• **Article Database** – Is anyone working on a database of Archimedes articles and programs published in Acorn User, Micro User and A&B Computing? Or would anyone be interested in helping to compile one, preferably in Arcscan format? Peter Jennings, St Albans.

• **BBC Charity software** – We have a whole load of BBC software to sell for charity, but I can't remember who the gentleman was who kindly sold it for us at his F.E. college. If he, or anyone else who could act as a broker for us, could contact us, that would be great.

• **Church Software** – Is anyone interested in converting some dBase IV programs for church administration into multi-tasking on the Archimedes? There is (some!) money available for anyone prepared to do the work. Contact the Editor.

• **Friday 13th virus?** – One reader had two hard discs on two Archimedes machines crash irretrievably at 13.30 on Friday 13th. Has anyone else had similar problems? If so, let us know what PD software you have got so that we can, by process of elimination, find a culprit.

• **FWPlus & Star LC24-10** – Has anyone got a driver for FWPlus which works properly with graphics on the Star LC24-10? Christine Shield, Northumberland.

• **Penman Plotter** – Has anyone got a manual they could lend or photocopy for Colin Thompson?

• **Stolen property** – Keep your eyes open for an A310 with serial number 1000816 and monitor 1001998. They were stolen from Martin Platts.

• **Tuition needed** – Free holiday accommodation and meals in a family home on the Isle of Wight are offered to someone who would be able and prepared to give a bit of help and tuition to a middle-aged A3000 owner who is trying to master various packages such as FWPlus, Datavision and Atelier. Exact terms by mutual agreement. Michael Halmarack, Greenside, Upper Green Road, St Helens, Isle of Wight, PO33 21UX. 0983–874090. A

Guild of Thieves + The Pawn

Richard Forster

Magnetic scrolls have finally got round to adapting their two first adventure games to run on the Archimedes. The two games, Guild of Thieves and The Pawn, were greeted with great enthusiasm in the computer world when they first came out. They marked the start of what I feel to be one of the two greatest adventure game companies of all time, the other being Infocom.

For those of you who have played any of their other games; Corruption, Fish! or Jinxter, the general layout is the same. For those who have not, you do not know what you are missing. Simply stated, the games have excellent pictures and the most accomplished parser of any adventure game.

Most adventure games that include graphics only have a few, poor pictures. This is certainly the case with all the other Archimedes adventures so far. Magnetic Scrolls' adventures usually have closer to fifty pictures, all of which are of excellent quality. The parser is extremely good and will understand most intelligible adventure words and expressions typed into it. It also has the makings of an Eliza clone – try typing in a noun on its own and then respond to it.

I have not played The Pawn yet, but have played Guild. Unlike the later games it is a simple 'find the treasure' adventure. The setting is one in which you are trying to become a member of the Guild, but this is pretty much by the by. The game contains a myriad of excellent puzzles and text. What is more, you get a mixture of goodies – a bank card, certificate, fixed die and a copy of "What Burglar" with the game. It all adds to the atmosphere (and the protection system) and is generally a lot of fun.

Availability of the games is a bit uncertain. I rec-eived my copy via another firm with whom I have had an order since August. The price on the box was £19.95, though could not guarantee it as a final price. Magnetic Scrolls adventures are excellent and I would advise anybody, however slight their adventure interests, to invest in some of them. A

Studio 24 Plus

Stewart Watson

When Electro Music Research issued Studio 24 Plus version 1 in 1988, it brought the Archimedes into direct competition with the Atari ST and the Amiga for a share of the highly competitive (and highly lucrative) computer music market. The price of much of the music software for the Atari is in the several hundred pound range for one disc plus a manual so there is obviously scope for big mark-up's on production costs.

Studio 24 Plus is a sensibly priced sequencer on which pieces can be recorded on up to 24 tracks within any pattern, and then patterns can be chained together to form a song. This approach is like a multi-track tape recorder where each track of tape is used to record a different sound.

What is a sequencer?

A sequencer is like a word-processor except that you usually use a music keyboard rather than a qwerty keyboard and for this, you need a Midi interface to communicate with the computer. With a sequencer, you can play something which the computer remembers. You can then manipulate it, store it and recall it at a later date for further editing. All the usual functions of a word processor are available: cut, copy, paste, insert, delete, etc.

Like a wordprocessor, you can also set up dummy arrangements like letters with addresses, signatures, etc but no text. For example, take a simple song where you have Introduction, Verse, Chorus, Verse, Chorus and Ending. Each of the different sections of the piece would be a pattern. For the sake of this example, the Intro will be pattern 1, the Verse pattern 2, the Chorus pattern 3 and the Ending pattern 4.

The Intro might consist of 4 bars of solo vamped piano, recorded on track 1 on Midi channel 1. The verse might be 16 bars long consisting of a trumpet melody on Track 4 Midi channel 4, piano accompaniment on Track 1 Midi channel 1, the bass part on Track 3 Midi channel 3 and a string section on Track 2 Midi channel 2. The chorus might be 8 bars long, dropping the trumpet on Track 4 and replacing it with a guitar sound on channel 5 and adding a vocal chorus on Track 6. The ending might be 1 bar long with all the voices playing one long chord.

Our song would look like this:

Demo Song

Bars	Track 1	Track 2	Track 3	Track 4	Track 5	Track 6
Pattern 1						
1- 4	Piano	–	–	–	–	–
Pattern 2						
5-20	Piano	Strings	Bass	Trumpet	–	–
Pattern 3						
21-29	Piano	Strings	Bass	–	Guitar	Vocal chorus
Pattern 2						
30-46	Piano	Strings	Bass	Trumpet	–	–
Pattern 3						
47-55	Piano	Strings	Bass	–	Guitar	Vocal chorus
Pattern 4						
56	Piano	Strings	Bass	Trumpet	Guitar	Vocal chorus

Notice that Verse 2 is pattern 2 repeated, and Chorus 2 is pattern 3 repeated as there is no need to record these separately if they are the same as Verse 1 and Chorus 1 (just like a 'copy block' with your wordprocessor).

Any track can be set to record or playback on any Midi channel, but experience has shown that the simpler you can keep things, the easier it is to remember where you are at any point. Whenever possible, I match the Track numbers to the Midi channel numbers for playback, using tracks 17-24 for internal voices when necessary.

If this arrangement of patterns and tracks was one you are going to use again, it would be well worth while setting all the tracks within the patterns, and the patterns within the song, saving that as a dummy file before you start to play. This would save you having to do this again.

Also, the patterns can be recorded in any order so there is no need to record the introduction first, but (as in most things) you can usually save yourself a lot of time if you have a plan of what you hope to do before you start.

Once the patterns are recorded you still have complete control over the music and can alter the tempo, the voices, the pitch, etc at will.

User friendly?

The front end of Studio 24 is very friendly with an interactive help window at the bottom of the screen so that you can see where you are at any point in recording or playback.

As a sequencer, Studio 24 plus version 1 compared very favourably with any of the industry standard sequencers for the Atari ST selling at more than four times the price but did not add any new features to tempt existing Atari users to trade in their computers for Archimedes.

Enter Version 2...

Version 2 adds many exiting new features to those of version 1. Most useful of these are likely to be the 3 new editors; a staff editor which allows you to manipulate notes from standard music staves, a drum editor which allows you to program rhythm patterns easily and a graphic editor which gives you a graphic representation of note lengths.

There is also a new SMPTE control panel for video timecode operation. To take advantage of this facility, to add synchronized soundtracks to videos, you need an SMPTE card and a Video Controller and Genlock card.

There is an on screen 24 channel mixer which allows you to control the balance of volume between the 24 tracks of each pattern. This mix is saved with each pattern within a song and saves you having to reset your equipment from one song to another – very useful indeed.

Another useful addition is a facility called Remote Keyboard. This allows you to control facilities like start, stop, record, etc from the music keyboard instead of having to move back and forth to the computer all the time. This can save a lot of time once you are organized in what you are doing.

The processing power of the Archimedes is most apparent in that, with the graphic display set to 'Score', the music appears on the screen the instant you play and scrolls along with it – very impressive.

Studio 24 Plus version 2 takes the Archimedes up to, and beyond, any sequencer for any computer that I have seen so far. As it is the first of many, it is just a matter of months rather than years before the Archimedes replaces the Atari ST as **the** computer for musicians.

In future articles I will deal with each of the editors in detail and explore how to use System Exclusive messages to save buying expensive RAM cards for your music equipment.

If you have any views or questions about Studio 24 or any other music related matter, please write in to Stewart Watson c/o the Archive office. For example, I have heard other contrasting views expressed about Studio 24 Plus and no-one should think that just because something appear in print, it has to be right. Let us know what ***you*** *think.* ***That*** *is what is important in this magazine. Ed.* A

Some thoughts on Unix

Ian Lynch

I will first come clean and admit that I am not a technical Unix guru but I have become more and more interested in Unix and I have been lucky enough to have had access to an R140 since they became available. Unix is a huge subject but it is particularly topical at present. Even sceptics in the micropress are admitting that the "Unix micro" is here and prices are set to fall close to the high performance PC end of the market.

There are some interesting implications here. Firstly, who will pay 10-100 times as much for a mini-computer when a micro will do the same job? Many think the mini-computer market will die during the next ten years. Secondly, why go to OS/2 from DOS when Unix has many more years of stability behind it, more power (and on an R140) would be similar in cost or cheaper than a 16 bit 286 PS/2 running OS/2? Most of the major players in the DOS world such as Lotus, Wordperfect Corporation, etc are producing Unix versions. The writing is on the wall.

So what is Unix?

I shall start at the beginning and explain some principles.

Operating systems are the programs which allow software applications, such as wordprocessors, to communicate with the hardware – microprocessors and other circuitry. Microcomputers have, up to this point in time, been a close and intimate fusion of operating system and hardware, with one set of hardware supporting a particular operating system. Witness the Intel/Microsoft/IBM cartel. How much better things might be if we had operating systems which were not hardware dependent and could run on any manufacturer's machines, were not restricted to a single user and were not constrained by memory limitations. Unix is such a system, and it is thought by many to be the "industry standard" standard of the future with over 50,000 software titles already available and accounting for 30% of the mid-range computer market. The snag with Unix is that it requires a very powerful computer in order to run and was, until recently, restricted to mainframe and mini-computers.

Now IBM, Apple, and Acorn are producing Unix workstations in addition to the traditionally dominant Unix companies such as Sun. Interestingly enough, most are now using RISC technology to do so. Sun's SPARC (scalable processor architecture) RISC processor is used by ICL in the DRS6000 as well as in Sun's own workstations. Sun say that the first 100 MIP desktop computer will be available before the turn of the century and it will be based on RISC technology. (Such a machine would probably run PC emulation faster than any current PC's in native mode!)

Acorn have produced the least expensive system to date and the R140 is, if nothing else, a versatile machine (it runs RISC-OS, a comprehensive emulator of the BBC B and the PC emulator). However, as far as Unix is concerned, it must be viewed as a minimal system. Most Unix systems can be expanded easily into the 10's if not 100's of Mbytes of ram and have hard disc support again in the mid-hundred meg range. Unix software from other systems has to be "ported" to the R140 first which means Acorn have to gain agreement from the software suppliers before making the software available and, currently, Unix software is not cheap. This is likely to change with volume sales and the fact that cheaper workstations will encourage lower software prices.

The relevance of Unix?

The relevance of Unix to many is controversial to say the least. If we take, as an example, education which is Acorn's traditional market, we are unlikely to find much in the way of primary school software under Unix. However, it is likely that Unix could be very useful to administrative tasks within LMS. In this respect, it could be particularly convenient if the LEA runs Unix on mini- or mainframe computers since the communication systems between schools and County Hall could be established very conveniently.

I have tested the R140 with Script, an LMS system from Nord Education Ltd. Script is a comprehensive system written in COBOL which provides for most of the data handling to do with students and

staff, LEA standard reports, stock control and finance that schools are likely to need. The advantage of running under Unix is that several users can log into the R140 from remote terminals and access the Script database simultaneously.

For example, a school with an Econet network of BBC B's or Masters could link the network to the R140 and have up to 8 machines from the network logged in at once. On a larger site, additional R140's would improve performance as UNIX allows the sharing of processing between machines on the network and correspondingly more access at simultaneously logged in terminals could be achieved. Networking between R140's can be by Ethernet or Econet, the former being faster but more expensive.

If we compare the cost of hardware at about £3,000 for a school to buy an R140 to the cost of a multi-user PC system with 5 machines operating under say Novel on Ethernet, schools able to use existing BBC machines as terminals to the R140 are going to save a considerable amount of money and have the benefits of a far more advanced multi-user network.

For schools with existing PC's, the argument is more difficult though with the right software, PC's could act as Unix terminals also.

I have only scratched the surface in indicating why Acorn are pursuing Unix. My own view is that they need to carve a niche for themselves as the low-cost high performance option for those with low funds. A separate graphics processor is essential in the CAD areas and what better than a second ARM 3? More memory expansion and big SCSI drive options seem to be just about there and conformity with OSI (open system interconnection) will ensure that anyone with a Unix network can simply hang an Acorn machine on it as a workstation. A

Archimedes in Education

Martyn Wilson

Prior to the Education Reform Act and the Educational Support Grant, Information Technology was making its way slowly but surely into the mainstream of all classroom activity. These two events (combined with a public who sometimes see counting the number of computers as a simple way to judge the worth of a school) have caused an explosion in demand for machines and for training in their use.

The training has introduced an extra element in the jigsaw. Information technology, when used by a "button pushing" generation, is no respecter of adults' reputations as experts. As we come to terms with the new technology, we also have to come to terms with pupils who are often quicker and more creative in their use of it than we are.

I arrived on the scene in the days of Computer Studies and programming projects and quickly joined the ranks of the "inventors"; a breed of teachers who, because we knew how to catalogue a disc regarded ourselves as experts. In my case, that notion was squashed by pupils who were able to retrieve files from corrupted discs which I couldn't even catalogue and devise software to read network password files (and even the information passing along the wires). I gave up trying to beat them, revised my definition of 'expert' and made them my network managers. From this position, they devised a security system which was foolproof, as they could always identify anyone capable of illegal access to the net without using the computer at all.

In my LEA, the decision to support the Archimedes as the "next generation" computer for most applications, was made very early in its life. It was a bold move, the benefits of which are becoming increasingly apparent. It raised difficulties which, for me, disappeared with the arrival of RISC-OS and the A3000. These two events seemed to convince many software writers that here was a machine into which it was worth investing their efforts. Prior to RISC-OS, we had worked hard to build links with software houses and had converted or commissioned software ourselves. Increasingly now, software writers come to us, both to seek our support for their products and to ask our advice on what sort of materials we see being used in education in the future.

We are now in a position where we have a coherent vision for the nature and form for software in our LEA. For many activities, we see a small "toolbox" of powerful software, capable of being used by pupils across a wide age and ability range. This

software "grows with the user". !Draw, for example, allows young children to enter fonts to create simple posters, gives more advanced facilities for object based drawing which satisfies needs in subjects as critical of such facilities as Design and Technology and provides a tool to combine text and drawing in all curriculum areas. It also has the merit of costing nothing.

Artisan was a program which saved the reputation of the Archimedes, in many teachers' eyes, in the early days. This too can be returned to and explored again and again as pupils progress and their needs develop. In both cases, they are programs which require the imagination of the user to produce worthwhile results. They are tools to enable and enhance learning.

Programs such as these also have another vital feature which illustrates the value of a consistent environment and a common machine base both within and between schools. They deal in file types which other programs can understand. Sprites can be taken into !Draw and both sorts of file can be exported to word processing or DTP packages.

The idea of combining the data, which had been created in different packages, gave rise to the idea of developing software which would allow pupils to use such data in a more coherent and meaningful way. This idea coincided with a visit from the three software writers who later formed "Software Solutions". Together, we developed the ideas for Genesis.

The ability to transfer data as diverse as music, sampled sound, graphics, text, animations and scanned images into a single package which gives the user almost total control over how this data is displayed, linked, searched and recalled, takes our software capability well beyond that envisaged by the writers of the National Curriculum. However, we are already asking for extra utilities to extend it! We are at an early stage of development in our usage of this program but it is included it in our Primary Toolbox which will, initially, place it in over two hundred and fifty primary schools. It is already site licensed in about twenty of our secondary schools.

Genesis offers so many facilities that we will continue to discover ways in which we might use it. We can't wait to see what imaginative applications pupils will find. It also includes a programming language which can be developed and modified in !Edit and I would anticipate a Genesis users' page in Archive before long. *(Are you offering, Martyn? Ed.)* If anyone would like to see examples of our early Genesis work I would be glad to send some files to Paul for inclusion on the Magazine disc. You will need a copy of Genesis to view it though!

One cannot talk about software without mentioning RISC-OS which is the most important item of software for the Archimedes. We try not to use software which doesn't follow RISC-OS conventions and we see this environment removing the barriers between different items of software. Already, it allows pupils to discover for themselves the uses to which they might put such software without the need to discover the different conventions software writers might otherwise impose. RISC-OS is also independent of filing medium. Net, Ram, floppy and hard discs are all accessed and treated in the same way. Roll on CD-ROM. Even the !Waiter network menu system, which was developed by a local firm, is proper Risc-ware.

Our Primary Toolbox is now almost complete and we hope it will comprise the following: Craftshop 1 & 2 (how glad we were when 4Mation decided to support the Archimedes), Pendown (whoever completes the best simple word-processor first is bound to have a success on their hands), Touch Explorer Plus (we had to provide the resources for its development), Compose, Easel (an art package developed by a local primary teacher), Dart, Tig and Infant Dart, a Draw, Paint and Edit instruction pack that we have developed ourselves, Genesis and Datasweet. The latter is another package we are very excited about. It provides superb, simple to use database and spreadsheet facilities in five linked packages. When viewed by an Adviser more used to the AppleMac, with all five packages happily multitasking from a single floppy on a 1M machine, she assumed it required a hard disc for such magic to be possible.

Another area which has produced much exciting work is Electronic mail. Another country seems to join the list of places with whom a school has contact almost every week. The ability to communicate so widely is the springboard for a host of activities in many curriculum areas. It also allows us to

provide information to schools instantly and our software notice boards which cover the whole curriculum are widely read.

The fact that the same facilities can be used by pupils from five to eighteen in ways they choose (using an environment with which they are instinctively comfortable) is perhaps the most exciting part of it all. We can only wait to see what future wonders their energetic, imaginative minds will produce to amaze us.

(An optimistic view! What do you think? Let us know by writing to Martyn c/o Archive. Ed.) A

Fonts on the Archimedes

Jim Markland

There has recently been a great deal of hype surrounding the introduction of various Archimedes RISC-OS desktop publishing packages. This has been accompanied by a flood of superlatives with regard to the new outline !Fonts application which goes with them. It is therefore timely to take stock.

DTP packages offer a presumption that the user wishes to print fancy multi-page documents. My colleagues produce technical reports and papers in abundance but, one way or another, graphics are mostly kept separate from text: wordprocessors suffice admirably and DTP has yet to arrive. (It will do shortly in the graphics department.)

This article not only avoids my inexperience in the DTP area but also sidesteps the intricacies of the outline font SWI's and attempts to take a broader view of the generalities. The hope is that it sets some pointers and assists you, the reader, to make a judgement about the new !Fonts.

Central to the issue, as usual, are the various file types which are instrumental in allowing the user to achieve various effects with alphanumerics and other characters. Such characters feature both in the active user/machine interface and in the more passive screen (static or dynamic) and hardcopy presentation roles. There are several file types of interest: the system font, those contained in and related to the old and new fancy !Fonts applications, the !Draw and sprite files .... not to mention several proprietary formats.

System Font

The logical starting point through this maze is the system font. This humble creature, a simple 8x8 pixel image with no antialiasing but which is very clear to read on screen, is of paramount importance as the prime user interface. It is simply a single sized character set, presented in a certain style, whose sole purpose is clarity. The system font is more concerned with utilitarian content than form. Language needs such as Russian or Greek and specialised symbols and operators such as those used in mathematics or APL can be dealt with by redefining these characters.

RISC-OS provides us with a number of alphabets, and various system font editors are available both commercially and as Shareware. For the latter purpose, the Acorn file type is FF7 and is a series of VDU commands. Unfortunately the results of changing the system font seem to pervade the entire screen. This isn't very helpful to those of us who would like to see one character set in selected !Edit windows and another everywhere else. Also, the operating system uses English, even if the user isn't!

Character sets are usually much larger than can be addressed from the conventional keyboard and less frequently used characters can be tedious to bring on screen. If this is a recurring problem then the PD program !Chars is for you. This application permits any character of the current set (or chosen fancy font) to be selected for use at the text cursor position at the click of a mouse button.

The reader with interests in content rather than form is, I'm afraid, now slightly offtrack. Although the fancy fonts, which I will discuss below, are capable of being defined with almost any content, and indeed are so used for special needs, their main purpose is the presentation of a more or less standard character set, properly justified, proportionally spaced and in different forms. For many users, however, the system font will suffice.

Before moving off the system font, though, it may be of interest to note firstly that a recent Risc User monthly disc included a range of system fonts in different styles and secondly that users of Pipedream and First Word Plus are able to avail themselves of Ian Copestake's specialised character sets for the same. (Incidentally I still haven't succeeded

in changing the PC Emulator system font – but didn't try too hard – any suggestions?)

Remember the hardcopy too. Here you may get something completely different from that which appears on the screen. That depends on the printer. I use a Panasonic KXP1124 24-pin which gives excellent results and carries an inbuilt range of 'system type' fonts. It will also accept downloaded character sets given a little extra memory.

!Fonts (Old version)

Most Archimedes users will be familiar with the anti-aliased bit-mapped fonts contained in the RICS-OS Applications Disks. These fonts first appeared under the Arthur operating system and are the very fonts which have recently been superseded by the new outline fonts. They have, in principle, application in a wide number of presentation roles.

There is, to my knowledge, a limited availability of this older type of font and very little is available as Shareware. A Font Editor was included in the Arthur Welcome disk but was not particularly well documented. Model data files were excluded and my own time consuming efforts in producing such fonts were disappointing. Little surprise then that our old !Fonts disk has seen little use.

RISC-OS 2.00 provides the bitmap font manager while the old font filing system comprises three components: the editor data files and, after anti-aliasing, IntMetrics and x90y45 files. The IntMetrics file gives the font dimensions while the 4bpp (bits per pixel) bitmaps are contained in the x90y45 file. Both of the latter files reside inside the !Fonts application, a pair for each font stored in appropriate subdirectories. Font are created in specified sizes and scaled, with some loss of quality, when others are required.

!Fonts (New Version)

The new version of !Fonts has a new outline font manager which comes in the form of two relocatable modules. These essential system components are available only with selected DTP packages and in the Acorn Font Starter and Newhall Font packs. A variety of font files can be held within the !Fonts application directories as previously. For each font, the minimum requirements are an IntMetrics file, as before and a new Outline file which literally gives the font outline in a form of !Draw path.

The font manager will create new fonts of the correct size from the Outline file when required and cache the resulting bitmaps for further use within the same session. Anti-aliasing takes place for fonts below a specified size and again results in 4bpp data. Larger fonts are not so treated and result in 1bpp data. Above a further specified threshold, the font manager will cache the outlines themselves and write the data directly to the screen. In this case, the font will not be anti-aliased, the Draw module being used to display the outlines.

!Fonts is accompanied by the !FontCtrl application which allows advanced users to customise the way in which the Font Manager works and allows the cacheing of specific bitmap fonts on disk for speedy use. The cached files will have a name like f480x480 (4bpp) or b120x120 (1bpp). The format of these various files is given in the Programmers Reference Manual and !FontCtrl file is reasonably self-documenting having a !ReadMe file. As an alternative method of control, the Font Manager provides new * commands.

This isn't all. The new system allows old style fonts to be used alongside the new with a sophisticated inbuilt decision making process when it finds that it has IntMetrics, Outline and x90y45 files all together in the same subdirectory. In this case it chooses to use the best bit-mapped font if it has an exact size match or uses a scaled x90y45 font if the size is less than a specified minimum.

Also, it is possible to disguise new 4bpp data as an x90y45 file in order to force scaling into operation. It is even possible to use the Outlines of one font with the IntMetrics of another where the exact font you require isn't fully available on screen (but may be on your postscript printer).

All well and good, but why the fuss? The answer lies in the quality of the results. They are undoubtedly very good indeed if used properly and this broadens the scope of application considerably, bringing in engineering drawings, posters, finely printed documents and other uses. I have produced some very pleasing results with them although this can be slow if you want high quality out of a dot matrix printer.

The high quality comes as a result of using the outline data. In addition to various forms of anti-aliasing, a process known as 'hinting' is possible. This uses scaffold lines and links to maintain the

geometry of the smallest characters and the direct use of the outlines themselves guarantees excellent results for the largest. Furthermore the outlines can be converted into !Draw files using either of two useful applications: (1) **!FontFX from DataStore:** this excellent utility enables quite spectacular effects to be created easily (text with shadows, text drawn in circles, etc.) (2) **The PD !FontEd** which works with individual characters – more of this below. *(!FontEd will be on our first 'Fonts' Shareware disc but that is not ready yet. However, it is available on Careware N°7, though this does not contain any outline fonts. Note also that this and !FontFX are not usable unless you have the !Fonts application. Ed.)*

The outline font system is certainly 'state of the art' and produces excellent results although it very quickly shows the merits of having a minimum of 2M RAM, 2 disk drives and an inkjet or laser printer. !Chars is useful for displaying the fonts, as is another PD application !Fonttest which was on the Archive BBS before the hacker struck.

The fonts themselves seem to have two principal sources at present. A company called Digital Type Services of Oxford is producing font files for the trade while Electronic Font Foundry sells directly to the public, but you do need the new font manager to use them.

What I presume are DTS sourced fonts are available now from Acorn (16), other fonts are available from Computer Concepts (2) and more are expected from both Acorn and Beebug. Risc User Jan/Feb 1990 lists these. Most of these carry names of Cambridge colleges to avoid copyright problems but they do follow traditional geometries.

EFF offer an amazing range of 112 fonts and claim very high quality results. They offer a fully illustrated brochure. It is indeed possible to import fonts from elsewhere or to design your own – the use of outlines makes this entirely feasible although one must advise caution if the scaffold lines and links are absent or insufficient. If this were the case, smaller point sizes could suffer considerably, depending on the font.

!FontEd is a FontEditor which could prove useful if properly documented, although version 0.19 says it is, as yet, incomplete. Simtron also announced a font editor with Archway, this is yet to appear. Acorn's file format is not copyright and, hopefully, a supply of good PD fonts will appear shortly as Shareware, with the above-mentioned PD utilities.

The new fonts require the use of the RISC-OS Extras printer drivers (Shareware 17) but remember that different printers have different needs and in-built facilities. Postscript deserves a mention here. Postscript printers usually have a good supply of inbuilt fonts and... surprise, surprise!... Postscript files can be read and edited by humans! (Why does this have to be the exception to the rule?) This means that, if you are lucky enough to have access to a Postscript printer, you can print out in fonts you haven't necessarily got on the screen.

To summarise so far: the new 'fancy' fonts are – as heralded – excellent, forming a splendid system resource and the new file format merits becoming the defacto Acorn standard to which all others should defer. They are central, in fact, to the definition of any type of 'non system' font on the Archimedes. This comment is expanded below.

!Draw files

Characters can, of course, be designed using !Draw directly and a number of 'drawn fonts' are available in the Shareware catalogue. The disadvantage with these is that, once in !Draw, they cannot be accessed from the keyboard. If you want to create such fonts, an ideal starting point is to convert the outline font files and, as noted above, !FontFX and !FontEd will do this for you.

Once in !Draw format, these characters can be embellished further. You may also chose to create your own in software using either the DXF or !Draw file formats. !Draw files can be exported into DTP or applications such as !Euclid which offer 3 dimensional extrusion and animation possibilities. Direct reading of the !Fonts Outline file permits direct manipulation of the paths (as done by !Font-FX) and, again, direction to a variety of applic-ations. Any volunteers for generating rotating text wrapped around a sphere?

There is a range of other applications which offer the ability to produce and manipulate vector fonts based on different file formats. These include AutoSketch, which now has a wider range of fonts, Linsign and LinCAD and also TechSoft Designer. AutoSketch exports DXF files which, in themselves, are the lingua franca for a number of vector graphics applications and as such are very useful. However, it is not clear whether the fonts can be so

exported or whether the proprietary files of other vendors are compatible with other applications.

!Sprites

Alphanumeric characters can be useful in sprite format for a variety of purposes: backdrops to animations, Icons, etc. An interesting text animation, which uses very fancy sprites, is included on the first two Elements (the Euclid user group) disks. Another text animation is on the Noah Demo disc. Although the fancy fonts can appear as bitmaps, they are not in sprite format.

There are various ways to create such sprite character files (the file format is always the central issue). Some, but by no means all, were discussed in my previous article on Graphics Applications. The possible use of Outline fonts as feedstock for the development of these is attractive.

Any Others?

Pixel Perfect, aimed at educational rather than professional printing needs, offers bit-mapped fonts in a DTP package with roots in the original BBC days. On a different tack, producers of technical reports may find it useful to consider an Archimedes version of PC-Tex. This, possibly in some ways like Postscript, is a page description language and offers, amongst other things, the possibility of presenting maths symbols in printed form (but not on the screen?). PC-Tex is public domain – there appear to be two Archimedes versions available. *(There is a native Archimedes version of TEX – See Archive 3.6 p4. Ed.)*

And now?

Entry into the new outline fonts is at present reasonably pricey, distribution of the new font manager being effectively controlled by Acorn. This means that you are not likely to buy them on a whim. This will slow their penetration as a true system resource. The motivation to buy must derive from a real need. The attraction is that they do appear to have lots of uses and can be used with !Draw, without the added expense of a DTP package. If DTP is for you anyway, then that route is probably a more cost effective entry point. As usual, it all depends on what you think you need and what you are prepared to pay: it may be that one of the other options is more appropriate. Once established, however, you will find that the marginal cost of acquiring additional fonts can be not unreasonable if you are prepared to be selective.

Acorn have announced that the new font manager will be included in future versions of RISC-OS. Perhaps some would be advised to wait for an upgrade of the operating system which they would no doubt wish to acquire anyway. *("Modified RISC-OS will not be available during 1990", say Acorn. Ed.)* The answer may be to be patient and watch what happens. As Outline Fonts can be used to produce very attractive results it would be very easy to make the investment without a clear perception of end use.

Notes

Electronic Font Foundry, Bridge House, 18 Brockenhurst Road, Ascot SL5 9DL. (0990) 28698 A

E-Type Designer

Duncan Burbidge

Having had a major success with their racing car game, E-Type, 4th Dimension complemented the game with a designer program, enabling you to design your own tracks.

The designer comes on a single 3.5 disc with instructions on a single A4 piece of paper. Booting the disc presents the same title screen as E-Type, except that it has the words 'Track Designer'. When the disc finally stopped, I was presented with a menu, consisting of Load Track, Save Track, New Track, Exit and Edit Track. The first two options are obvious, allowing you to load and save tracks the to be edited.

The option New Track brings up a submenu consisting of, Length Only, Sprites Only, Height Only, Curve Only and Full Track. These allow you to delete parts of the selected track. Length Only allows you to alter the length, e.g. from 5 miles to 10, though this won't effect the track design. Sprites Only will delete all the sprites, i.e. the policemen etc on the track. Height and Curve allow you to delete all the curves and hills on the track, while Full Track destroys the whole track and allows you to start from scratch.

From the main menu, you can edit the loaded track by selecting Edit Track. This brings up a new screen.

The idea of designing a track is to work along it as you go. At the top left hand corner is a flat, grey rectangle, running horizontally which represents the road. It shows all the sprites that have been put on the track. To the right of it are two lines. The top one shows the height of the road (it raises as you select the height). The bottom one shows the curve of the road. You can select three curves: steep turn, medium turn and slight turn and you can also select a straight road. Although this sounds complicated, you have to see it on screen as it is difficult to describe. At the top right corner is the selected sprite, e.g. a policeman. I found it a good idea to select your height, curve and sprite at the same time because, sometimes, going back deletes what you have done.

There are many more options such as: choose the colours of the side of the road, put a sprite anywhere in the road (except the middle, only the Finish sprite and Time Bells can be put there), jump around the track to certain positions and many others. Although most of the control is done via the mouse, the keyboard is used as well.

Conclusion?

I found the E-Type designer quite hard to use. However, after some time I got used to it. I feel the instructions could have been better, taking you step by step through designing a track. A sprite editor would have been a nice feature as well. However this package will be the only E-Type Designer, no other company will write one, so you'll just have to get used to it!

Overall though, the E-Type track designer is extremely useful if you have E-Type. The only problem I found was that you had to save your track and then load E-Type to try it out! This is the only thing that spoils the game! Apart from this, the designer is a good piece of software. At least E-Type won't be limited any longer to just having 5 tracks!

Playabilty	10/10
Value for money	8/10
Overall	9/10 A

DTP Column

Ian Lynch

Ken May, writes with some more experiences with Acorn DTP. He has had some problems with the fact that saving multiple paged documents on a single floppy drive machine requires many disc swaps. I'm spoilt because I have a hard drive and I must say that it is a great advantage for DTP which requires a lot of resources in terms of graphics and text. Acorn DTP uses a slaving to disc system which means that a work disc is required. Since a file with the outline fonts is also needed regularly there is not much room left on a single floppy for saving the document. Saving the document on a separate disc is what results in the computer prompting so much disc swapping.

There are many possible trade-off's here, but on a machine without a hard disc it is unwise to plan large multi-page documents. Split the document into many parts with only a few pages in each. If you have extra ram, a large font cache will mean that the font disc will only be needed when a font is first used, provided the font cache never fills completely. Alternatively, a ram disc with the fonts and work directory will help, with documents saved to floppy. (Both ram disc and font cache can be adjusted using the task manager – see page 63 of User Guide.)

A many paged document with lots of large sprites could become too big to fit on a disc, so keep a check on the size of large documents. There are different views on whether it is best to get a memory upgrade or a hard disc upgrade as a first priority. I would say that with Acorn DTP, a memory upgrade for 1M machines may have the edge because reading font information from a hard disc is still slow and printing on a 1M machine is very tedious. For Impression, a hard disc is a better bet but 2M and a hard disc will satisfy most needs on either.

If you do get into the middle of a "disc swapping save" on Acorn DTP cancelling may be a hazard, as Ken has experienced the machine hanging up – forcing a reset which can cause loss of the file both from the machine and the disc! 'Keep files small and make regular backups' is definitely good advice for those without a hard disc.

Printer problems

Tim Hubbard has had problems when pausing

between printing pages on Acorn DTP (1.02) using the !PrinterDM dot matrix driver. I tried this also and got the same result. The machine seems to hang up. Does anyone out there know of a cure? If you do come across bugs like this please let me know – sometimes there is a simple explanation and, if not, Acorn or the software company need to be informed so that they can fix things for any future release.

Obtaining images

John Jordan writes about scanners. He has just bought the Irlam i-scan which has been advertised recently and seems to offer higher resolution than others currently available. I use a Beebug A4 scanner which originally came with some makeshift software but has since been upgraded. The Beebug hardware appears to be the same Mitsubishi device that is used in Computer Concepts Scan-light and most other A4, 200 dpi scanners. The main difference between these is therefore, likely to be in the software.

Since image manipulation is best done in !Paint or an art package, the most important features are the ability to dither and anti-aliase the image to produce grey scales since the hardware is actually monochrome. Image processing to represent grey scales provides effective results but is unlikely to reproduce actual grey levels accurately.

The Irlam scanner is designed to produce 16 true levels of grey and should produce significantly better results. I am hoping to try one out in the not too distant future.

Clare's have a colour scanner and I am sure scanners capable of displaying higher resolutions and more grey scales are not too far off.

Scanned images are very memory hungry and you will find difficulty in fitting very large ones into !Paint without extra memory. John has sent me a couple of scanned pictures in which he was rather disappointed. It looks to me as though they have scanned monochrome with no intermediate grey levels. He says outline drawings are good which would support this theory. Scanners are very useful for DTP, so if you use one and have any advice please write.

Another way of getting pictures into your document is to use digitised video. Since Watford brought out their digitiser, there have been several others. Wild Vision, Video Electronics and Brainsoft all have digitisers but with very different prices. The Brainsoft digitiser is part of a multiple podule providing audio digitising and input/output facilities for data in addition to video. At a bit over £100 it seems remarkable value for money though I haven't actually seen one. *(It has now gone up to £127 + VAT and no Archive discount. Ed.)* Video Electronics on the other hand produce a digitiser which is capable of displaying 32,000 colours on the screen at once using 15 bit colour. It is difficult to distinguish the digitised picture from live video! Near photographic quality colour prints can be obtained on a suitable printer so full colour DTP is possible. The Wild Vision system is somewhere in the middle. Of course video digitisers are useful in video production and other screen effects so they are rather expensive to simply use in DTP. *(Also Pineapple and Digithurst have colour digitisers. Ed.)*

Perhaps the least expensive way of producing illustrations is to use pictures already in digital format. Drawfiles and sprites can be imported directly, but files in other formats will need converting first. A public domain RISC-OS application called ChangeFSI is available which will easily translate many picture file formats to sprite format. These include Mac TIFF files and IBM PC Electronic Arts format, and, in fact, swapping between different screen modes on the Archimedes.*(Sorry to interrupt again... ChangeFSI was on Shareware 22 but Acorn suddenly decided it wasn't PD after all! You now have to buy it from Wild Vision for £30ish. S/W 22 now has a similar package on it called Traslator. Ed.)*

Impression master pages

Does anyone know how Andrew Provan can design an Impression master page so that he can print envelopes via the envelope feed of a Deskjet Plus? I am not familiar with this printer, but to define a new Master page in Impression: Press <menu> then edit –> View master pages, <menu> then edit –> New master page. Now edit the dialogue box to the required layout and click on OK. This will set up a Master page which is then implemented in the main document window by edit/alter chapter and specifying the number of the master page (17 if it is the only additional one defined).

Another query concerns blank pages. If you have a page which is incomplete and press <return> until the cursor finishes this page and starts a new blank page, deleting the newly created page from the edit menu will not work. Instead you must delete the return characters on the blank page which disappears when you reach the previous page.

Mathematical DTP

Specialist DTP in the fields of maths and science requires specialist symbols and characters. Computer Concepts' Greek font is a help, but integral signs and the like are still not catered for in outline fonts as far as I know. Architex is a version of the text formatting program written by Donald E Knuth which should satisfy all the requirements for scientific and mathematical type setting and I am currently trying to find out more about this software. Many more outline fonts are becoming available from Ian Copestake, Beebug and others, so the lack of variety on the Archimedes compared to PC's and Mac's is not likely to persist for ever. A

Two Technical Books

Brian Cowan

Archimedes and RISC-OS

by Zvonimir Racic

Any new book on the Archimedes is a welcome arrival. Apart from what the book contains, it is an indication that publishers are taking the machine seriously. This book comes from Prentice Hall as part of their Reference Guide series, other volumes covering such topics as Turbo Pascal and Harvard Graphics. In fact, this is a translation from German of a book published in 1989 and in places its age shows. It appears that details of RISC-OS have been added at the stage of preparation of the English edition.

Bad language

The fact that it was translated from German would explain some very strange language quirks. Thus, while the plural of 'appendix' is given as 'appendixes', (nothing wrong in that for the modern reader) the plural of 'mode' is given usually as 'modi'. On page 201, we see the reason why; the singular there is rendered 'modus'. On page 203, we encounter 'mode' and 'modes', which seems quite consistent until the page header is seen to revert to 'modi'. Although not a serious matter (for those who have had the benefit of a classical education), it does indicate a certain lack of care in the production of the book. This shows through in other places as well.

Flip top

The physical construction of the book is a little unusual. It is spiral bound so that the pages lay flat, but at the same time it has hard covers for good protection. Finally, the pages are printed in vertical format so that you flip them over like a reporter's notepad. I was initially not very keen on this arrangement but, in practice, it takes up less desk space. It is very good for using at the computer but not so convenient for casual reading.

Remember Arthur?

The book gets off to a bad start by assuming the old Arthur operating system is being used. It tells you how to reset the CMOS RAM by twice doing a switch-on with the "R" key pressed. Using Arthur, it was necessary to perform the operation twice since it had the effect of toggling between standard and high resolution monitor types. This is no longer the case in RISC-OS, where the operation has a more limited result and the new switch-on plus "delete" gives a complete reset of CMOS RAM.

And the Welcome Disc?

Mention of the now defunct Welcome Disc is then made and the user is told how to format and backup discs from the command line. This is then followed by a section titled 'The Desktop (Only in Arthur)'. This is all rather off-putting, particularly to the novice, since all sane(?) users must by now be using RISC-OS and such operations as formatting discs are very conveniently performed from the desktop. Clearly, the book was written during the Arthur era and although additions have been made to accommodate RISC-OS features, no deletions of obsolete information have been made.

Down to business

Chapter two comprises the bulk of the book. The title of this chapter is 'The CLI Commands'. The

chapter is essentially an explanation of all the "star" commands of the Archimedes. The commands are treated in alphabetical order and, for each command, its name and abbreviated form are given, followed by the syntax for the command and a summary of its effects. There then follows an example of using the command. This section is very nicely presented and it includes the commands new to RISC-OS such as *RmFaster. I find the alphabetical ordering far more convenient than that in Acorn's documentation where commands are listed by function. If you don't know what the command is for then you don't know where to find it!

PC emulation

There then follows a very short chapter (10 pages) on the PC emulator. Unfortunately (although understandably) it is an early version (1.2) of the emulator which is discussed, so many of its limitations no longer apply. There is an analysis of the compatibility of DOS programs, the conclusion of which is that most non-protected programs are OK. Speed is examined and we are told that the emulator runs as fast as a standard PC. Graphics however run somewhat slower, but disc operations match those of much faster machines.

Sensibly, the utilities Getfile and Putfile are explained. This is particularly valuable since Acorn originally forgot to document these features. Unfortunately there was no mention of getting the mouse running and the need to use the Microsoft bus mouse driver. In all, not a very useful chapter relating mainly to an obsolete version of the emulator.

RISC-OS desktop

Chapter four deals with the RISC-OS desktop. In about twenty pages, the main features of the desktop are covered. Use of the mouse and its keys are covered and the screen windows and icons are explained. This is all perfectly adequately covered but then it is also covered in the Welcome guide which accompanies each machine.

Finally, there is an appendix which is mainly a listing of the *FX commands and their uses.

Conclusion

I must confess I found the book a bit of a disappointment. There is very little of use in the book which is not contained in the Acorn documentation which comes with the computer. Starting with Arthur is particularly unfortunate, although not important for the main contents of the book. The main chapter dealing with the star commands is very good, but it is essentially a manual – it is not what you would call a readable book. There are no insights into the machine or snippets of information which are not available elsewhere.

Verdict

It is of interest to compare the book with the Dabs book by Alex and Nic van Someren. Although that book is at a higher level, it is readable and full of interesting information. It is the logical next step for anyone who has worked through Acorn's User Guide. This book is mainly a beautifully presented summary of all the star commands. To purchase that book at a cost of £18.95 seems rather an extravagance to me.

Archimedes and RISC-OS
by Zvonimir Racic
Prentice Hall (1990)
ISBN 0-13-044074-4
281 pages, £18.95.

VL86C010 Users' Manual

by VLSI Technology inc.

This is the definitive hardware reference for the ARM chip set. The data sheets for the four chips in the ARM family have always been available from the American manufacturers, VLSI, and here they are collected together with much other useful information. It is, however, important to realise that this book is about the four ARM chips and not specifically about the Archimedes machine. The book is in seven sections together with an appendix.

The first section contains an introduction to the RISC idea together with an account of the ARM implementation of the scheme. There is a brief summary of the functions of the four dedicated chips and the concept of an integrated solution is discussed, whereby a family of chips is designed and optimised to operate together sharing the various tasks of the computer.

Next comes a section devoted to the ARM CPU. Pinouts and signals are explained. The structure of the chip's instructions is explained and there is a summary of the various instructions together with their condition codes. The chip's registers are

summarised and special uses of particular registers are explained. There are also details of coprocessor register transfers.

There follow sections devoted to the memory controller (MEMC), the video controller (VIDC) and the I/O controller (IOC). Each such section covers pin connections and signal levels and there are timing diagrams indicating the various data transfer cycles.

There is a brief section on two ARM development systems consisting of a card to fit a PC slot. There is an eight bit PC card and a 16 bit AT-type card.

Finally, there is a comprehensive account of the ARM instruction set.

Unfortunately, there is no mention of the ARM3 nor is there even a discussion of the MEMC1a chip. By the same token, there is not even a hint of new chips to follow, although I am sure that there are new MEMC and VIDC chips on the drawing board which will support oodles of RAM and give mega-pixels of resolution.

This is not a book for casual reading. It is information at its most terse – the raw data sheets. However, I think that there is much information that is not available elsewhere. I have found earlier versions of the book invaluable. They were free (to serious?? users) and I wonder if the price of £19.10 is a little on the high side – it will certainly deter the casual reader but, for the dedicated hardware buff, this book is an absolute must.

VL86C010 Users Manual
by VLSI Technology inc.
Prentice Hall (1989)
ISBN 0-13-944968-X
200 pages, £19.10. A

Using the PC Emulator – 2

Richard Forster

As with the Archimedes, the PC uses a tree structure for the filing system. The system of directories is very similar and so there should be little problem in understanding it if the basics of ADFS are understood. As with the Archimedes we have directories and files – directories giving a structure to the disc. There are three important commands: MKDIR, RMDIR and CHDIR (the commands can be abbreviated to MD, RD, and CD respectively) and it is these commands we shall examine this month.

Making and changing directories

MKDIR stands for "Make Directory" and is similar to the Archimedes' command CDIR. The official syntax of the command is:

```
MKDIR [drive:][path]name
```

In practice, I find it is far more convenient to enter the parent directory and then create the new directory from there, rather than to attempt to remember some massive path.

Type into your machine (when you have booted it up and it is ready):

```
MKDIR DUMMY
```

Directories can be immediately spotted in a catalogue because they are always followed by <DIR>. There is also no three letter extension, though some files can share this attribute. If you now catalogue the disc you will see a line similar to:

```
DUMMY <DIR> 2-10-90 12:46p
```

We have now created a directory called DUMMY in the root directory. To enter this directory we use the command CD meaning "Change Directory". As with MKDIR and RMDIR, this command is one of the ones which is built into COMMAND.COM and so will always work without any need of a file called CD.COM, etc. Enter this new directory by typing:

```
CD DUMMY
```

Now type in DIR and several things will be revealed to us. Firstly, we are informed that we are in a different directory. If you look at the top of the directory you will see it says "A:\DUMMY". If we created another directory inside this directory called say NOTHER and entered it, we would see the line "A:\DUMMY\NOTHER". Try it if you want.

The other thing you should notice is what appears to be two files "." and "..". They are not actually files but they work as if they were. Before we investigate them, I would like you to create a dummy file so that I will be able to demonstrate another nice feature. Call the file TEST.TXT – you can use the COPY CON technique we discussed last month.

In the Archimedes' native mode, if you want to enter the parent directory, you type in DIR ^. There is no similar command built into MSDOS, so what happens is that the file ".." actually means the parent directory and "." means the present directory. Therefore, in order to move to our parent directory we type in:

```
CD ..
```

There is one other directory related thing I want to mention before taking a short break (we will deal with RMDIR later) and that is the root directory. On the Archimedes it is called $ but on the PC it is called \ (backslash). As you will see when I talk about paths, the backslash is used elsewhere (rather annoyingly) but it has one important immediate use in that CD \ will take us to the root directory.

Hard disc users only

Floppy users can skim through the next few paragraphs, as I really need to say a word to hard disc users. This series is written from the point of view of a floppy user, as I presume the majority of readers fall into this category. If you use a hard disc, many of the commands will have to be slightly changed, in that drive A: (or sometimes B:) will instead be C: for you. If, for example, you wanted to copy the FORMAT.EXE file from the boot disc, you would type:

```
COPY A:FORMAT.EXE C:FORMAT.EXE
```

Much of this is academic because, if you carried out the instructions on page 9 of your manual, all the boot disc files will already be in the root directory of your hard disc. I disagree with this approach however, as I find many of the files are rarely used. Even if you wish to keep all the files on your hard disc, there is no reason why you should have them cluttering up the root directory, slowing everything down.

Place your boot disc (floppy) into the drive. Make sure it is write protected and type in:

```
A:FORMAT C: \S
```

This will format the hard disc and place the three files necessary to make it a boot disc into the root directory. Copy over CONFIG.SYS as explained last time, using C: instead of B:. We are now going to create a directory into which all the MSDOS commands can be placed. I like to keep my directory names short so we will call it DOS. Into this directory you can copy FORMAT.EXE and any other MSDOS command files. Type in:

```
MKDIR DOS
```

When you type in a file name, the PC will search through your current directory. This is fine if you use floppies and have all the files in one directory but means that, on a hard disc, you have to change directories all the time. Actually this is not the case because, as with the Archimedes, you can set up a list of directories for the machine to search through.

The command for this is called PATH. The syntax of the command is :

```
PATH [[drive:][path][;[drive:]
                          [path]...]]
```

Where a path is one or more directory entries, each separated from the previous one by a backslash. A pathname is the same except that after the final backslash, we have a filename.

A pathname can be used all the time where a filename is needed. If you needed to view a file in another directory (for example the file TEST.TXT in directory DUMMY) instead of entering the directory and then typing in the required command, you could type in the required command with the filename of \DUMMY\TEST.TXT.

If you are using a hard disc, it helps if you set a path which will search through the DOS directory if nothing is found in the current one. Typing in the command everytime you turn on is laborious but there is an easy way using a facility we have already seen – AUTOEXEC.BAT. Create the file but instead of inserting a blank line, insert the line:

```
PATH C:\DOS
```

Paths can always be used when a file is needed. When you use the copy command, if you don't use a path, it will copy into (or from) the current directory. The upshot of this is that if you want to copy files into a certain directory, you just enter it and issue the command. For example, if you wanted to copy FORMAT.EXE into the DOS directory of your hard disc, you would type in:

```
CD DOS
```

(unless you were already in it) then

```
COPY A:FORMAT.EXE FORMAT.EXE
```

Directories (continued)

Returning to directories, we encounter RMDIR, short for "Remove Directory". Commands like this are very powerful and very dangerous. Imagine a situation where you have all your accounts in one directory and accidentally type in RMDIR – a lot of vital data can be lost. RMDIR will fortunately not allow you to do anything like this.

The command is limited to removing directories NOT removing their contents. If you try typing RMDIR DUMMY you should receive the (really helpful!) error message "Invalid path, not directory, or directory not empty." As you have probably realised, typing in RMDIR CONFIG.SYS will also not work, since CONFIG.SYS is a file. RMDIR will also fail to work if there is another directory inside the one you are trying to delete – even if that directory is empty.

There do come times however, when it is desirable to delete files – and even to delete directory contents. The command to do this is DEL and it is this command that you must use with the most care. The delete command has an optional switch. This is a letter you can add to the command and, in this case, it will demand verification for each file to be deleted. I would advise you always add it. The syntax for the command is therefore:

```
DEL [drive:]pathname /P
```

Note that the sign before the P is NOT the one used when identifying directories; it is a forward slash, not a backslash.

Before we finish, let's remove directory DUMMY from our discs. There are several ways we could do this depending on whether we use paths or not. You could try:

```
CD DUMMY
DEL TEST.TXT /P
CD ..
RMDIR DUMMY
```

Or if you feel more confident with paths:

```
DEL \DUMMY\TEST.TXT /P
RMDIR DUMMY
```

Next month I shall show you some of the more useful files on the MSDOS boot disc. A

RISC-OS for Beginners

Adrian Look

The Archimedes claims to be the world's fastest microcomputer; with its 32-bit RISC microprocessor it is capable of running at a staggering rate of four million instructions per second. Its custom-built video controller (VIDC), memory controller (MEMC) and input/output controller (IOC) chips ensure that the tremendous power of the CPU is accessible to the 'outside world'.

Now Acorn has finally got its act together with regard to the operating system for this machine and has produced something worthy of its hardware. That something is RISC-OS.

This series will attempt to show you some of the many ways in which RISC-OS has managed to harness the power of this remarkable machine.

Multi-Tasking Archimedes

This month I will try to introduce the concepts behind the RISC-OS multi-tasking environment and to provide an insight into some the techniques needed to use the facilities it offers. The primary aim of is to increase your understanding of RISC-OS, although you may also increase your programming repertoire a little. (For those of you interested in programming full-blown desktop applications I suggest that you also follow Alexander Goh's articles.)

RISC-OS is capable of running more than one program (or task) at the same time and hence it is called a multi-tasking operating system. However, the ARM central processor unit (or CPU for short) can only operate **one** command at a time. This means that in order to make the Archimedes multi-tasking, Acorn have had to cheat a little. What really happens is that RISC-OS switches the CPU's attention from one task to another. This can be done many times a second and so gives the illusion of multi-tasking.

Several advantages come with multi-tasking systems, the most obvious of which is the enable it to make use of idle CPU time. Many of the CPU's operations involve communications with its

peripherals e.g. RAM, I/O, keyboard, screen, etc. More often than not, these peripherals are slower than the CPU and so the processor spends much of its time waiting for the peripherals to catch up e.g. printing a document on a dot-matrix printer. By implementing an operating system which can switch its attention between several programs, the CPU can be used when it would otherwise be idle. Thus it would be possible for the CPU to execute a word processing program while it is waiting to send the next character to the printer.

Learning to share your Archimedes

RISC-OS provides a special type of multi-tasking environment called a co-operative multi-tasking environment. This means that each task must be capable of sharing system resources such as CPU time, screen display, memory, peripherals, etc. For example, a task can, in theory, use as much CPU time as it likes but if it uses too much, any other tasks running on the system will grind to a halt. This is what happens when you run the !Magnifier program on the RISC-OS Applications Disc Two. Similarly, if a task assumes that the printer is always free and tries to print while another task is already printing, the result will be a mish-mash of the two print-outs. Therefore, in order to make your programs multi-task, you must learn to design them so that they can share system resources.

The key to sharing system resources is to assume nothing. Where possible, your program should get the operating system to tell it about the environment in which it is working and either adapt to that environment or produce a sensible error message.

There are so many instances where this doctrine should be employed that it would be impossible to cover all of them in the magazine. Such a compilation would rival the new Programmers' Reference Manuals in size and diversity. Instead we will look at how to access the multi-tasking facilities of RISC-OS from BASIC.

The WIMP does all the work

The multi-tasking facilities of the Archimedes are provided as an integral part of the RISC-OS Window Manager, which means that in order to make your programs multi-task, you will have to learn to program the WIMP (Windows, Icons, Menus and Pointer) environment.

Such a prospect can be intimidating even for experienced programmers. Those of you who are brave enough to continue may be comforted to read that I intend to introduce this topic slowly. To this end, I shall only be explaining the multi-tasking facilities of Window Manger and not the windowing facilities themselves.

Declaring your program to the Window Manager

When a program wishes to become multi-tasking, the very first thing it must do is declare itself to the Window Manager. This enables the Window Manager to keep track of all the WIMP tasks and so regulate them. It does this by issuing each program with its own reference code or 'task id', which should then used whenever the program communicates with the Window Manager.

You can use the 'declare' function shown below to tell the Window Manager that your program wishes to become multi-tasking:

```
REM >program
:
DIM task% 4 : $task%="TASK"
taskid%=FNdeclare("ProgramName")
:
REM main program
:
END
:
DEFFNdeclare(task$)
LOCAL taskid%
SYS "Wimp_Initialise",200,!task%
                  ,task$ TO ,taskid%
=taskid%
```

More specifically, this function informs the Window Manager that the program wishes to become a "RISC-OS 2.00 WIMP task" by calling the SYS "Wimp_Initialise" routine. To explain this statement, we will look at the three parameters needed by the SYS "Wimp_Initialise" routine:

(i) 200 is derived by multiplying the current version number of the Window Manager by 100 i.e. RISC-OS currently contains Window Manager version 2.00. This parameter is needed to provide upward compatibility with any further releases of RISC-OS.

(ii) The task% variable tells the Window Manager that the program is a new style WIMP task (i.e. multi-tasking) rather than an old Arthur 1.2 program. If the task% variable is not set up properly, the Window Manager will emulate the old Arthur 1.2 WIMP environment. (Arthur 1.2 is the operating system with which the Archimedes used to be supplied but it has now been superceded by RISC-OS)

(iii) The task$ variable should contain a short description of the program, usually the program name. This description is used by the Task Manager and will appear in the Task Window (see page 63 of the User Guide for further details).

Once the Window Manager receives this information, it will issue the program with a task id number i.e. **taskid%**.

Taking your turn

Now that your program has declared itself to the Window Manager, it can continue as normal, well almost! If your program did do this then any other tasks being run on the Archimedes would grind to a halt because your program would be hogging all the processor time. So the second thing we must do is to learn how to adapt BASIC programs so that they can take turns with the CPU's time.

This simply involves repeatedly asking the Window Manager what to do next and then acting accordingly. By doing this, your program can be sure that it is free to perform any processing i.e. the other tasks have finished their processing (for the time being anyway).

The technique used most often for this job is called a polling loop and usually consists of two BASIC constructs: a REPEAT ... UNTIL loop and a CASE ... WHEN ... ENDCASE structure. These two structures are briefly explained below but for further details you should refer to either the Acorn 'BBC BASIC Guide' pp 331-345 or Dabs Press 'BASIC V for the Acorn Archimedes' pp 21-28.

The REPEAT ... UNTIL construct causes the computer to repeatedly perform any BASIC commands in between the REPEAT and the UNTIL. The computer will continue to do this until a certain condition is fulfilled. For example, in the listing below, the computer will continue to add one to the variable 'count' (and print the result) until the variable 'count' equals 10 i.e. the computer will count from one to ten.

```
count=0
REPEAT
   count=count+1
   PRINT count
UNTIL count=10
```

The CASE ... WHEN ... ENDCASE construct is similar to multiple IF statements. For example, the listings below are two ways of performing the same task. The first listing uses multiple IF statements and the second uses a CASE ... WHEN ... ENDCASE construct. The later is tidier and is supposed to be faster.

listing 1:

```
IF count=1 THEN PRINT "one"
IF count=2 THEN PRINT "two"
IF count=3 THEN PRINT "three"
```

listing 2:

```
CASE count OF
  WHEN 1 : PRINT "one"
  WHEN 2 : PRINT "two"
  WHEN 3 : PRINT "three"
ENDCASE
```

The polling loop

The example listing below demonstrates how you might implement a polling loop in your own BASIC program. The SYS "Wimp_Poll" command asks the Window Manager what the program should be doing next and also releases the CPU time for other tasks to use. In reply to this command, the Window Manager will return a number into the variable **reason%** – the number that is returned is usually called a reason code. Fortunately, most of the reason codes that the Window Manager returns are related to windows and so we do not need to concern ourselves with them. The reason codes that we do need to take notice of are 0, 17 and 18.

Reason code 0 means that the program is free to perform its own processing. However, as we have said, the program should not use up too much CPU time i.e. it should perform only a little bit of its calculations at a time.

Reason codes 17 and 18 means that a 'user message' has been received, of which there are

several types. The only type of message that we are interested in is user message zero (hence the IF !block%=0 below). This message tells the program that it should try to close down because the user has (i) left the desktop or (ii) selected the 'quit' option in the task manager.

An example of a polling loop:

```
DIM block% &400
finished=FALSE
REPEAT
   SYS "Wimp_Poll",0,block% TO
                              reason%
   CASE reason% OF
      WHEN 0     : PROCmainprogram
      WHEN 17,18: IF block%!16=0
                  THEN finished=TRUE
   ENDCASE
UNTIL finished
```

Closing down

When closing down, your program must tell the Window Manager (again!) that it is doing so – the listing below is an example of how this should be done:

```
REM >program
:
DIM task% 4 : $task%="TASK"
REM initialise program
REM main program
:
PROCclosedown(taskid%)
END
:
DEFPROCclosedown(taskid%)
SYS "Wimp_CloseDown",taskid%
                              ,!task%
ENDPROC
```

The SYS "Wimp_CloseDown" command informs the Window Manager that the program wishes to close down by passing the program's task id and the variable task% (as explained earlier). Having done this, the program is free to 'end' as it wishes. This procedure should be followed whenever your program wishes to quit – even when an error occurs.

Example program

I have included a complete program to demonstrate how all these techniques fit together. The program is a simple alarm clock. When run (in the desktop) it will sit in the machine until a certain time is reached when it will sound a beep. To cancel the alarm you must hold both the <alt> keys down.

Final remarks

As you may have gathered, the Window Manager is the key to the whole multi-tasking environment. Programs that wish to multi-task properly should not do anything without first being told that they can do so and second telling the Window Manager what it is doing. (Who said that Acorn don't keep a tight reign on application programmers!)

In the next article, I will be exploring the RISC-OS desktop environment and showing you how to make best use of the facilities it provides. Until then, happy RISC-OSing!

```
 10 REM >alarm
 20
 30 REM ***************************
 40 REM *Simple Desktop Alarm Clock*
 50 REM *  by Adrian Philip Look   *
 60 REM *    27th March 1990       *
 70 REM ***************************
 80
 90 PROCinitialise
100 finished=FALSE
110 REPEAT
120   SYS "Wimp_Poll",0,block% TO
                                reason%
130   CASE reason% OF
140     WHEN 0    :PROCmainprogram
150     WHEN 17,18:IF block%!16=0
                   THEN finished=TRUE
160   ENDCASE
170 UNTIL finished
180 PROCclosedown(taskid%)
190 END
200
210 DEFPROCinitialise
220 DIM task% 4 : $task%="TASK"
230 DIM block% &400
240 taskid%=FNdeclare("Alarm")
250 alarm=FALSE : set=TRUE :
                        when$="12:15"
260 ENDPROC
270
280 DEFFNdeclare(task$)
290 LOCAL taskid%
300 SYS "Wimp_Initialise",200,!task%
                    ,task$ TO ,taskid%
```

```
310 =taskid%
320
330 DEFPROCclosedown(taskid%)
340 SYS "Wimp_CloseDown",taskid%
                              ,!task%
350 ENDPROC
360
370 DEFPROCmainprogram
380  REM get the time
390 time$=MID$(TIME$,17,5)
400  REM is the alarm set and the
  time correct? If so start the alarm
410 IF time$=when$ AND set THEN
                    alarm=TRUE : set=FALSE
420  REM if the alarm has be started
           sound a beep every second
430 IF alarm AND (TIME MOD 100)=0
                                THEN VDU 7
440  REM if both <alt> keys are
          pressed turn off the alarm
450 IF alarm AND INKEY(-6) AND
          INKEY(-9) THEN alarm=FALSE
460 ENDPROC A
```

Hyperbook – A new concept?

John Laski

Hyperbook, produced by Longman-Logotron, claims to "retain a layout and feeling as similar as possible to that of a conventional book", but "the computer... allows users to carry out sophisticated searches [so that it] assists the researcher in developing multiple themes...". The package consists of (1) the Hyperbook reader which is the program to run Hyperbook's facilities and contains a small demonstration text for which there is a tutorial, (2) Hyperbook 'books' on which a text has been prepared for use with the Hyperbook reader and (3) an 'Authoring system' which will convert ASCII text into the special format required to run the Hyperbook reader. The books are either literary, e.g. Hamlet, or factual compendia e.g. The Education Reform Act. There is also a promotional 'Green Disk' that contains pollution information and a built-in Hyperbook reader for that disk only. Overall, I am highly enthusiastic about the packages but this is tempered by severe dissatisfaction over certain aspects of its implementation.

Usefulness of Hyperbooks

Hyperbooks can be made up from lengthy texts and, conveniently, the authoring system allows these texts to be put together from up to 30 files. The text is compressed to 30% to 50% of its original length. These texts can be annotated, and multiple indices can be built to discover whether particular ideas find expression in the text and, if so, where.

With literary texts, the criteria chosen for creating an index could perhaps express some interesting hypothesis about the work and the author's ideas whereas with factual compendia, the criteria would probably express interesting relationships among the facts. These criteria must be expressed as the occurrence of a group of words or the co-occurrence of a word from one group within a few lines of a word from some other group, or of a word from one group but not a word from another. This is far more powerful and useful than the associations that are built into search systems, concordances, databases and browsers. However, formulating the criterion for an interesting index is an interactive process of trial and error and requires demanding, challenging, intellectual labour. Hyperbooks are not a short-cut to what we are familiar with, but a heavy tool to build roads over uncharted land.

Documentation

With the Reader comes a 64-page A5 book. The design and typography puts most documentation to shame. With each application comes a 16-page booklet in a similar format containing a summary of the Hyperbook commands and details of some interesting things that have been prepared with the text for you to explore as well as some suggestions of other explorations that might be made of the text. The Authoring System comes with a 32-page book.

The Reader documentation contains a tutorial, a section on executing and configuring Hyperbook, filing, and then more detail on indices, annotations, glossaries, vocabularies and moving about in a Hyperbook (that were first met in the tutorial) and finally, a quick reference summary. The system is implemented on IBM, Nimbus and Archimedes. The documentation is common but with alternative paragraphs for the various machines with their different operating systems.

The authoring system documentation discusses text layout and suggests how to use typical wordprocessors, including First Word Plus. I have written a text editing and formatting program of my own and had a go at Hyperbook-ing some of its documentation. My first shot hung the system because the default setting of my WP produces 61 lines per page, while Encode accepts a maximum of 60 lines, so I reformatted my text and had my own Hyperbook straight away. (I indexed 'complicated' and its cognates and then 'flexible' and its cognates. Hyperbook found 8 references in each case, so I concluded that my documentation was balanced!) I am told that a hyperbook prepared on one machine can be transferred to another but I haven't tried it.

Obey$dir and system state

Hyperbook can, it is claimed, be run from both the desktop and the command line. The first is true, and the second may be on drive 0, but not when transferred to a hard disk on 4. The problem is, as usual, setting Obey$dir, from which HB$dir is derived. This specifies a path to all the related directories and files needed. I was unable to get the program to work when I tried to run it from :4.Hyperbook without editing the driver programs supplied.

This is a common problem and I think it is Acorn who have not thought carefully enough about what is needed. If you need to run from the command line, you have to experiment by running from the desktop and then, using *show, find the current setting of the Obey$dir string. Hyperbook resets the default directory and picks up the files it needs relative to this. This should not be necessary. Hyperbook also sets the characters 128-155 to the IBM character set. It is poor practice for any application to leave the machine in a different state from that in which it found it and, in this case, I can barely see the necessity.

Logotron would claim that one may want to edit a text with the bytes showing the IBM character set. I should have preferred to have seen this provided as a file which defines these characters via vdu 23 calls and a general access to the command line interpreter. In my view, all systems in which one dwells (rather than executes a short command) should provide this facility as a matter of course.

Implementation

I have just detailed what I consider to be a gross fault in the implementation and I shall be listing lesser faults below. However, it would be unjust not to praise the overall implementation.

If you want to create an index, you start off an indexer. This runs as a co-routine (internal task) in the background of whatever else you are doing. Up to four of these co-routines can run concurrently. This is a very elegant style of programming that could be used in many other situations, but rarely is.

After a while, I found it easy to get about the program on the screen, both with a mouse and using the keyboard. There was, generally, enough information on the screen to tell me what to do and not too much to swamp me. Response was very rapid, except for building a vocabulary. I think this should have been coded as a co-routine but there may be internal reasons why this could not have been done. I found the keyboard easier than a mouse to get around the screen. This may be me, but I think it is because, essentially, the screen is a collection of buttons. Also, the facilities to put out the indices, etc. in an ASCII format to a file for separate browsing or to Epson-style printers are smooth and powerful, as was the facility to configure for individual printers through HBSetup.

Now for some complaints

One of the nicer features of Hyperbook is the capacity to amend index predicates. As I suggested earlier, sensible Hyperbook research involves a development and debugging of these predicates which articulate one's attempt to objectify and refine one's concepts.

There are two problems here: firstly, one may have removed some unintended references from an index, but they will reappear if they fit the refined predicate. I think this is inherent in the present concept of indices and, indeed, there may well be circumstances when one wants them to re-appear. Secondly: one can save indices for reloading on a subsequent run. The system associates indices with Hyperbooks so that only indices applying to a particular Hyperbook can be loaded with that Hyperbook. However only the index identifier, not the index predicate, is reloaded. This means that one can neither examine this predicate nor refine it on a

subsequent run. I think this is the only conceptual design error I found but it is a major omission. All the other capabilities, annotations, glossaries and vocabularies save and restore smoothly.

This omission is very serious if you are dealing with a multi-volume text. There is no way to apply a concept you have formulated when dealing with one volume to another volume. Moreover, there is no way to concatenate several books into one. The Education Reform Act comes on three disks and, with a hard disk, one would clearly want to treat these three as one book. I suspect this concatenation would be a non-trivial task given the elaborate and effective way in which Hyperbook texts are packed and stored. You can get out individual pages as straight ASCII, but not the whole text. Thus if you had the authoring system and the time to get out and append together all the pages of each volume it could be done. I shall not try it unautomated. I would suppose this is a marketing decision, since the capabilities to unpack exist in Hyperbook and to re-pack are in the encoder.

The Hyperbook community

The authoring system reduced a chapter of the documentation for my WP from 28k to 21k. This is less than the 55% compression claimed by Logotron but I have a wide vocabulary and this was a relatively short text. (The compression appears to set up a vocabulary and specify a text by a sequence of references into that vocabulary.)

The authoring system will pick up text from up to 30 files to go into one Hyperbook – this is excellent user-engineering and the whole dialogue engendered by Encode is clear and convenient. However, if I Hyperbooked my whole manual which, to make it easier to use, I would very much like to do, only people with the Hyperbook reader would be able to use it. Now, Logotron obviously want the widest possible readership for Hyperbook. It is a commercial matter but I think Logotron would have been better advised to produce an authoring system that created something like their Green Disk that anyone can read, perhaps in such a way that those who do own a Hyperbook reader can extend the use of the text.

Conclusion

It is sometimes said that apart from word-processors, databases and spreadsheets, there are no original applications for personal computers. This is something of an exaggeration. I think that Hyperbook systems will be joining that select few over the next few years. Logotron's version needs to be revised and rethought but it seems to me to be a good entry point for people to find out what Hyperbooks are all about and they are certainly of immediate practical use in an educational or library context. It is not reasonable to expect this to be a final version. I doubt whether anyone could foresee at this present time precisely what capabilities mature Hyperbook Systems will possess. A

Family Favourites

Graham Bisset

Minerva's latest offering, Family Favourites consists of three separate games, BrainDrain, DeadEnd and Gridlock, these are modernised versions of 'old favourites'.

Pelmanism

Braindrain is essentially a memory game where you and the computer compete to find the matching pairs hidden behind golden coloured blocks. You begin by choosing a level of difficulty, either Easy, Medium or Hard, your choice being spoken to you by a clear sampled voice. To give the user a chance against the computer, the programmers have implemented a handicap system whereby the computer is given only a limited memory from which to remember cards. Initially it won't know where anything is and neither will you!

You begin by turning over two cards, if they match you gain a point and continue, if they don't the computer will then take a turn. It will also turn over two cards, remembering what you turned over and where. If it finds a pair then it awards itself a point and carries on. A scroll bar at the top of the screen shows how much memory the computer needs to find a pair, if the bar scrolls only part of the way there is a good chance that it will match something. However if the bar scrolls to the full, its likely that it will simply make a guess.

Sampled sound is used throughout, to good effect, but it would have been good to have a sound on/off

key. All in all, a well implemented version of this type of game.

Snake game

DeadEnd is a version of the old snake game. It involves you and the computer drawing a line wherever you go, hoping to make the computer crash into one of the sides or trap it into a DeadEnd!

It took me a few minutes to get the hang of it because the keys are not my preferred ones (Z, X, ' and /) but rather Q, A, O and P. I would have liked a redefine keys option as I'm sure I'm not the only one who prefers Z, X, ' and /. The initial title screen features some average digitised graphics and a pounding drum beat which continues when you are playing the game.

If you complete the first round you then move onto the solo round where the numbers 0-9 are arranged in the style of telephone buttons. You must manoeuvre the line through each of the numbers in an order randomly selected by the computer. Although each number is highlighted, the colour used for highlighting is not sufficient to make it stand out and I found myself constantly referring to the panel above to see where I had to go next, resulting in death on most occasions. *(When we tried it we didn't even notice that they were highlighted – we just shouted out the numbers to each other! Ed.)* If you fail the solo round, you do not lose a life, you only go back to the level you came from and you must complete it again. You begin with five lives.

Reasonably good graphics are used throughout the game, particularly in the explosion sequences but it's a shame that the game is let down by some basic omissions – the sound (Why is there no music?), the non-redefinable keys and the lack of a sound on/off key. Had these been included, this game would have been a winner but without them, for my money, it doesn't make the mark.

Othello / Reversi

The last game in this compilation is Gridlock. An explanation of this rather strange name appears on the title screen. The game is actually an implementation of Reversi or Othello. While the program is loading, a drum beat (another one!) plays in the background and you choose the level of the game either Low or High.

For those who don't know the game of Othello, let me give you a brief description. The game is played on a 8 x 8 board with the first 4 counters (2 of each colour) already in place. To win, you must end up with more squares of your colour on the board than your opponent. This is done by clicking on a square which has at least one disc of the other colour between it and another of your own discs either in a straight line or on a diagonal. Every disc of your opponent's colour along the line between your discs, will be converted to your colour. (Believe me, it's easier playing it than reading my description!)

The Minerva implementation is very well done with good graphics and good use of colours which are not harsh on the eyes. Whether you win or lose, a sampled noise will greet you; if you lose the computer laughs at you but if you win, a pleasant fanfare sounds.

I found that the Low and High settings didn't seem to make much difference to the way the computer played; it still won 8 times out of 10. (Not too bad for a beginner, I suppose!) Again on this game, no sound on/off key is available. This is probably the best game of the three for both sound and graphics but it doesn't exactly stretch the Archimedes to its limits.

From my brief investigation, all the games are written in BASIC with one or two machine code routines for speed. They work on 1M machines but I don't know if they will work on A305's as well.

The games are all run from the desktop and, in all of them, pressing <escape> twice will take you back to the desktop without, hopefully, any loss of data. Although they run from the Desktop they don't install on the icon bar and so they take over the whole machine for each game.

The disc is not copy protected. (Minerva finally seems to be heeding the pleas of hard disc users. Let's hope more companies take this attitude.) It costs £19.95 and is distributed by Minerva Software (0392 437756).

These three games provide reasonable value for money at £19.95 but perhaps £15 might have been more appropriate when you compare it with some of the games available on PD discs. It's also unfortunate that none of these games has a two player option – another sad omission. My advice: try it before you decide to buy it. A

Fact-File

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